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Nevada
Environmental
Restoration
Project

Rulison Site

Surface Closure Report

July 1998

Environmental Restoration
Division

U.S. Department of Energy
Nevada Operations Office

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UC-700

RULISON SITE
SURFACE CLOSURE REPORT

DOE Nevada Operations Office
Las Vegas, Nevada

July 1998

RULISON SITE SURFACE CLOSURE REPORT

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List of Acronyms and Abbreviations

AEC	U.S. Atomic Energy Commission
Austral	Austral Oil Company
BTEX	Benzene, toluene, ethylbenzene, xylenes
CAP	Corrective Action Plan
CAR	Corrective Action Report
CDPHE	Colorado Department of Public Health and Environment
COPC	Constituent(s) of potential concern
DOE	U.S. Department of Energy
DOE/NV	U.S. Department of Energy, Nevada Operations Office
EPA	U.S. Environmental Protection Agency
ERDA	U.S. Energy Research and Development Administration
ft	Foot (feet)
H_2SO_4	Sulfuric acid
HCl	Hydrochloric acid
HNO_3	Nitric acid
IT	IT Corporation
km	Kilometer(s)
LTGMP	Long-Term Groundwater Monitoring Plan
LTHMP	Long-Term Hydrologic Monitoring Plan
m	Meter(s)
m^3	Cubic meter(s)
MCL	Maximum contaminant level
mg/kg	Milligram(s) per kilogram
mg/L	Milligram(s) per liter
mi	Mile(s)
mL	Milliliter(s)
MS/MSD	Matrix spike/matrix spike duplicate
NPDES	National Pollutant Discharge Elimination System
pCi/g	Picocurie(s) per gram
QAPP	Quality Assurance Project Plan
QC	Quality control
RCRA	*Resource Conservation and Recovery Act*
RPD	Relative percent difference(s)
SGZ	Surface ground zero

List of Acronyms and Abbreviations (Continued)

TCLP	Toxicity Characteristic Leaching Procedure
TPH	Total petroleum hydrocarbons
TDS	Total dissolved solids
TSS	Total suspended solids
VOC	Volatile organic compounds
VSAP	Verification Sampling and Analysis Plan
yd^3	Cubic yard(s)
°C	Degree(s) Celsius
°F	Degree(s) Fahrenheit
µg/kg	Microgram(s) per kilogram
µg/L	Microgram(s) per liter

1.0 Introduction

This Closure Report provides documentation for closure of the Rulison Site surface and summarizes the data from groundwater monitoring conducted quarterly in 1996 and 1997. The quarterly groundwater monitoring was conducted to demonstrate that no contaminants are migrating from the pond after completion of the pond remediation activities.

The Rulison Site is located in the North ½ of the Southwest ¼ of Section 25, Township 7 South, Range 95 West of the 6th Principal Meridian, Garfield County, Colorado, approximately 19 kilometers (km) (12 miles [mi]) southwest of Rifle, Colorado, and approximately 65 km (40 mi) northeast of Grand Junction, Colorado (Figure 1-1). The site is situated on the north slope of Battlement Mesa on the upper reaches of Battlement Creek at an elevation of approximately 2,500 meters (m) (8,200 feet [ft]). The valley is open to the north-northwest and is bounded on the other three sides by steep mountain slopes that rise to elevations above 2,927 m (9,600 ft).

Project Rulison was a joint U.S. Atomic Energy Commission (AEC) and Austral Oil Company (Austral) experiment. It was conducted under the AEC's Plowshare Program to evaluate the feasibility of using a nuclear device to stimulate natural gas production in low-permeability, gas-producing geologic formations. The experiment consisted of detonating a 40-kiloton nuclear device at a depth of 2,568 m (8,426 ft) below ground surface on September 10, 1969, followed by natural gas production testing in 1970 and 1971 (AEC, 1973).

The site was deactivated by the AEC and Austral in 1972. Cleanup associated with site deactivation consisted of removing all equipment and materials not needed for potential future gas production activities, and characterizing the site's radiological condition through extensive surface soil sampling. In 1977, the site was abandoned. Neither the U.S. Energy Research and Development Administration (ERDA), the successor agency to the AEC and predecessor to the U.S. Department of Energy (DOE), nor Austral planned on commercially producing gas from the site. Cleanup associated with site abandonment consisted of removing all remaining equipment and materials, plugging the emplacement (R-E) and reentry (R-EX) wells, backfilling the mud pits adjacent to the R-EX well, removing tritium-contaminated soils, and further characterizing the radiological condition of the surface soil. A summary of site activities is presented in Table 1-1. Detailed descriptions of the site deactivation and abandonment activities, and

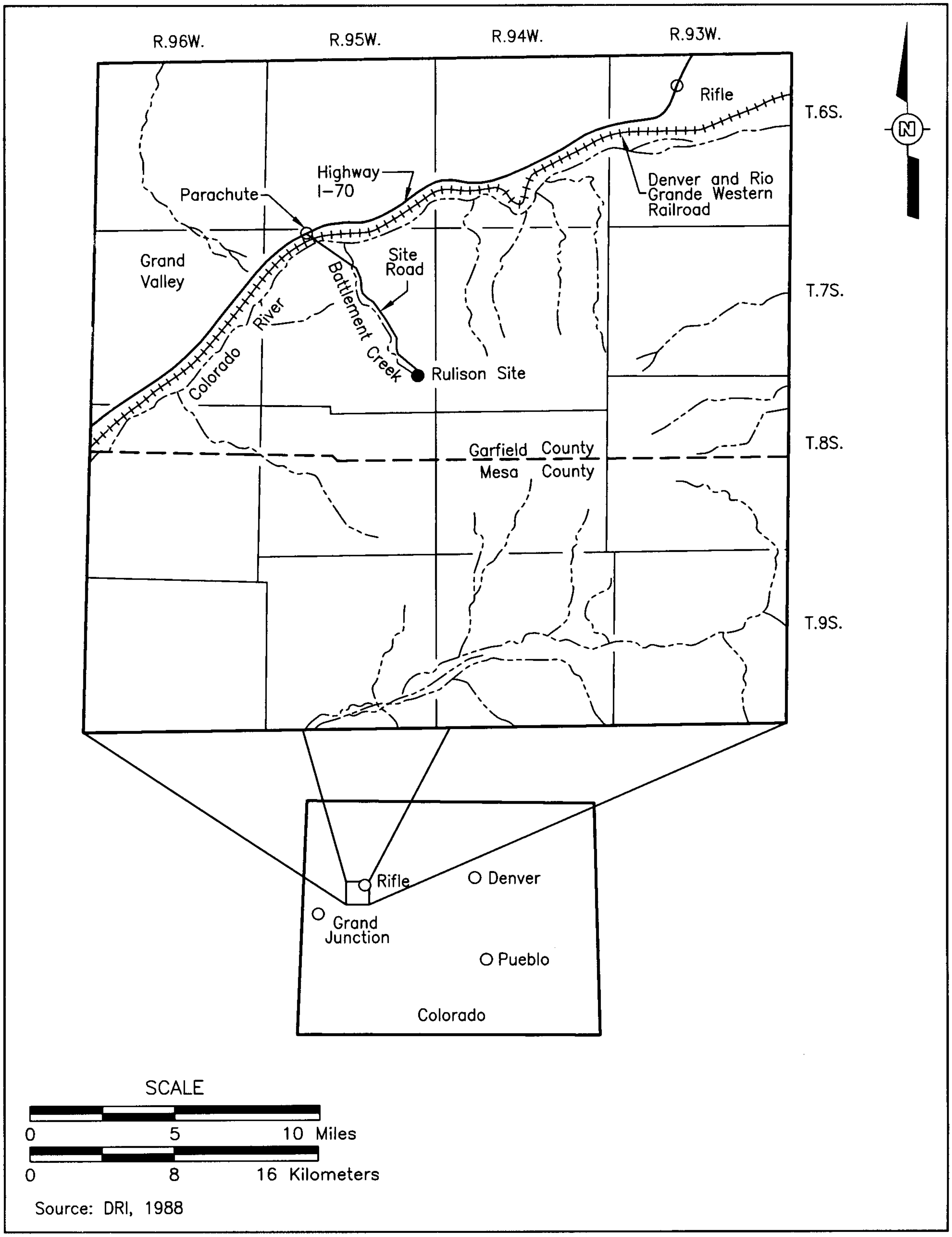


Figure 1-1
Location of Project Rulison Area

Table 1-1
Summary of Activities at Project Rulison Site

Sept. 10, 1969	Detonated Project Rulison device.
Oct. 1970 - April 1971	Conducted natural gas production testing.
July 10 - 25, 1972	Site deactivated. Initial cleanup. Removed extraneous materials not required for gas production. Conducted extensive surface soil sampling to characterize the radiological condition of the site.
1972 - Present	Annual Long-Term Hydrologic Monitoring Program (LTHMP) conducted by the U.S. Environmental Protection Agency (EPA).
Sept. 1 - Oct. 12, 1976	Site decommissioned and abandoned. Final cleanup. Removed all remaining equipment and material. Emplacement Well R-E and re-entry Well R-EX plugged and abandoned. Mud pits adjacent to R-EX backfilled, tritium-contaminated soils removed, and surface soil sampling conducted to characterize radiological condition of the site.
June and July 1993	Conducted Sensitive Species Survey; Wetland, Vegetation, and Floodplain Study; Class II Cultural Resources Field Survey; and an Aerial Radiological Survey.
Sept. and Oct. 1994	Sampled pond sediment, soil, surface water, and fish.
April 1995	Sampled pond sediment, soil, and surface water.
Aug. - Nov. 1995	Remediated Rulison drilling effluent pond. Installed 7 groundwater monitoring wells, sampled surface soil and stream near ground zero area. Aquifer tests on RU-03 and RU-06A.
1996	Conducted four quarterly groundwater sampling events from the groundwater monitoring wells.
September 1996	Evaluated Rulison pond ecology.
1997	Conducted four quarterly groundwater sampling events from the groundwater monitoring wells. Sampled 5 natural gas wells in the vicinity of surface ground zero (SGZ).

Sources: DOE/NV 1996a, DOE/NV 1996e, IT 1996, and IT 1997.

radiological characterizations are presented in *Rulison Site Cleanup Report* (AEC, 1973), *Project Rulison Well Plugging and Site Abandonment Final Report* (ERDA, 1977), *Rulison Radiation Contamination Clearance Report* (Eberline, 1977), and the *Preliminary Site Characterization Report, Rulison Site, Colorado* (IT, 1996).

The drilling effluent pond is an engineered structure located approximately 400 m (1,312 ft) north-northwest of SGZ (Figure 1-2). The drilling effluent pond was used to store

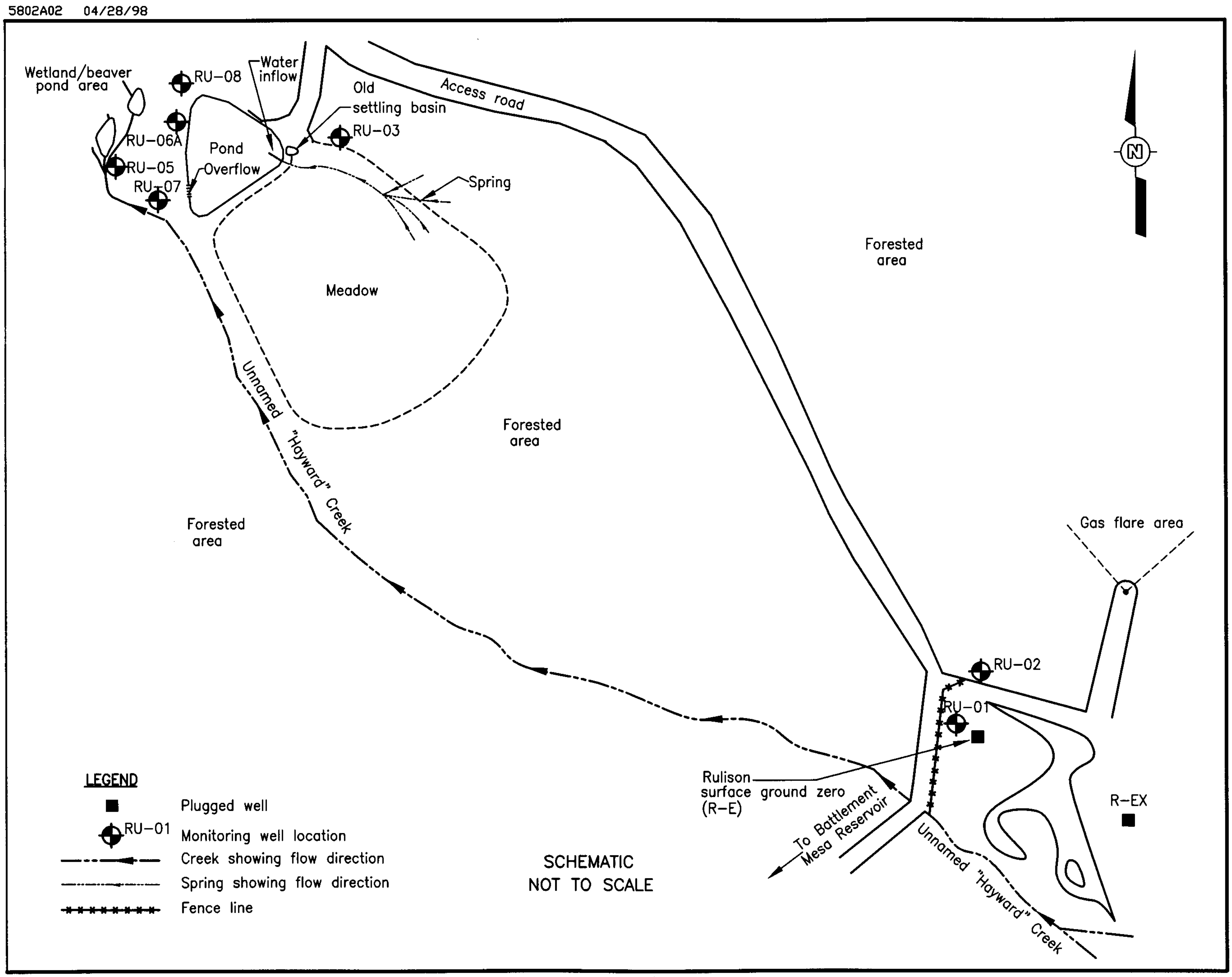


Figure 1-2
Rulison Site Map

nonradioactive drilling fluids generated during drilling of Well R-E, the device emplacement hole. The drilling fluids consisted of bentonite drilling mud that may have contained various additives, such as diesel fuel and chrome lignosulfonate, used to improve drilling characteristics. Most of the drilling wastes were removed from the pond when the site was cleaned up and decommissioned in 1972; however, some drilling fluids were left in the pond. Following completion of site decommissioning, the pond structure was left in place at the request of the property owner. Subsequently, it was used as a freshwater holding pond by the property owner who stocked it with rainbow trout.

In 1994 and 1995, sampling events were conducted to evaluate the extent of residual contamination from the drilling fluids left in the pond. Samples were collected from the pond sediment and soil, from surface water from the pond and the nearby stream and spring, and from Rulison pond fish. Analytical results from these sampling events are presented in tables in *Corrective Action Plan, Rulison Drilling Effluent Pond* (DOE/NV, 1996a).

There are no regulations for soil parameters for RCRA metals specified in the Colorado Department of Health "Storage Tank Facility Owner/Operator Guidance Document." The following regulatory limits are based on 20x the RCRA "Maximum Concentration of Contaminants for the Toxicity Characteristic." The regulatory limit for nonspecific total petroleum hydrocarbon (TPH) is based on regulations specified in the Colorado Department of Public Health and Environment (CDPHE), "Storage Tank Facility Owner/Operator Guidance Document." Chromium was found above the regulatory limit of 100 milligrams per kilogram (mg/kg), in 11 of the 18 sediment samples, and in all five soil samples. The highest level of chromium detected was in a sediment sample at 2,170 mg/kg. Barium was found above the regulatory limit of 2,000 mg/kg, in four soil samples. The highest level of barium was in a soil sample at 6,870 mg/kg. Lead was found above the regulatory limit of 100 mg/kg, in one sediment sample at 427 mg/kg. Nonspecific TPH was found above the regulatory limit of 250 mg/kg, in eight sediment samples and two soil samples. The highest level of nonspecific TPH detected was 72,6000 mg/kg in a sediment sample. Benzene, toleume, ethylbenzene, xylenes (BTEX) compounds were not found above the regulatory limit for total BTEX of 50 mg/kg, in either sediment or soil samples. None of the analytic concentrations were above the regulatory limit in the pond, stream, or spring water samples; however, trace concentrations of nonspecific TPH were found in the fish samples. The highest nonspecific TPH level detected in a fish sample was 31.5 mg/kg. The Toxicity Characteristic Leaching Procedure (TCLP) was performed on seven sediment samples and three soil samples. The results of these analyses indicated that the metals in the sediment are unlikely to migrate (DOE/NV, 1996a).

Based on the results of the sampling events, the DOE decided to conduct a voluntary cleanup action at the pond to reduce the levels of TPH and chromium in pond sediments and soils in and adjacent to the pond. The pond cleanup and a SGZ investigation were completed in November 1995.

1.1 Purpose

The purpose of this Closure Report is to:

- Present the results of the eight quarterly groundwater sampling events.
- Use the quarterly sampling results to demonstrate that no contaminants are migrating from the pond.
- Summarize the risk to human health and the environment from the remaining mud pits adjacent to the R-EX well.
- Obtain a Notice of Completion from the CDPHE for the Rulison Site surface.

1.2 Scope

There were two areas of concern addressed during the remedial activities and summarized in the *Rulison Corrective Action Report* (DOE/NV, 1996e); the drilling effluent pond and the SGZ area. The scope of work implemented for closure of the drilling effluent pond consisted of removing fish, draining the pond, removing contaminated bentonite sediment from the pond, stabilizing the sediment, disposing of the stabilized sediment, installing groundwater monitoring wells, and reconstructing and restoring the pond.

The scope of work for the SGZ area investigation was to provide sufficient information to close the mud pits adjacent to Well R-EX in-place with no further action, confirm the findings of the radiological survey conducted during site deactivation and abandonment, and install two groundwater monitoring wells in the alluvial aquifer, downgradient from the emplacement well.

The SGZ investigation consisted of drilling and sampling soil borings at the location of mudpits in the vicinity of the R-EX well. Samples were also collected from the stream sediment, stream bank soil, and stream water adjacent to and downgradient of the R-EX well to determine if any contaminants present in the mud pits were migrating to the stream. Shallow soil samples were also collected from the gas flare and the R-EX well areas to confirm the findings of earlier radiological surveys.

2.0 Closure Activities

2.1 Description of Corrective Action Activities

This section of the Closure Report discusses the activities involved in the closure of the Rulison Site surface. Information about the remediation of the Rulison Drilling Effluent Pond, and investigation of the SGZ area will be summarized, since more detailed information is available in the *Rulison Site Corrective Action Report* (DOE, 1996e). This Surface Closure Report will cover in more detail, the results of the two-year, groundwater monitoring program initiated to assess whether contaminants are migrating from the drilling effluent pond.

2.1.1 Rulison Drilling Effluent Pond

Approximately 14,025,000 liters (3,705,000 gallons) of water were pumped from the pond prior to and during the sediment stabilization and removal operation. Pond water and construction dewatering was discharged to the adjacent stream under Colorado Wastewater Discharge Permit Number COG-310084 (Appendix A) as issued by the CDPHE under the *Colorado Water Quality Control Act* (DOE/NV, 1996e).

Approximately 18,656 cubic meters (m^3) (24,400 cubic yards [yd^3]) of stabilized sediment was hauled to the South Canyon Landfill for disposal. The original TPH cleanup criterion of 250 mg/kg in soil was increased to 1,000 mg/kg after a series of negotiations between DOE and the CDPHE representative. A copy of this letter is included in Appendix B. This reduced the amount of sediment and native soil that required stabilization and removal, and reduced the cost of the cleanup action (DOE/NV, 1996a). Verification samples were collected from the floor of the Rulison pond to confirm that the TPH concentration was below the 1,000 mg/kg cleanup criterion. Closure verification results are discussed further in Section 3.0 of this report.

Following verification sampling, a Bentomat® geosynthetic clay liner was installed in the pond and covered with Kentucky bluegrass sod to protect it from ultraviolet exposure and erosion (DOE/NV, 1996e).

The pond currently covers approximately 0.5 hectare (1.2 acres) as measured at the top of the berm; it is triangular in shape and is approximately 6 m (20 ft) deep from the top of the berm to the pond bottom (DOE/NV, 1996e). The pond currently contains water and has been recolonized by a number of aquatic plants and animals. However, at the time of the September 1996 investigation, the pond was not suitable for trout habitation due to a lack of dissolved oxygen (IT, 1997).

2.1.2 Surface Ground Zero Investigation

The SGZ investigation consisted of soil, stream sediment, surface water, and groundwater sampling, and the collection of radiological confirmation samples. Sampling is detailed in the *Rulison Site Corrective Action Report* (DOE/NV, 1996e). A total of eight soil borings were drilled in the Well R-EX mud pit area (Figure 2-1). The soil boring samples were analyzed for BTEX, TPH, *Resource Conservation and Recovery Act* (RCRA) metals (both total and TCLP-extractable), gross alpha/gross beta, and tritium. Analytical results from the SGZ investigation are included in Appendix C.

Total petroleum hydrocarbon was detected in the shallow samples from all eight soil borings, ranging from 66 mg/kg in sample SB03-05/10/15, to 4,700 mg/kg in SB07-18/22-01. Total petroleum hydrocarbon was detected in deep samples from four of the eight borings ranging from 66 mg/kg in SB01-15 to 150 mg/kg in SB02-20 (DOE/NV, 1996e).

Benzene, toluene, ethylbenzene, and total xylenes compounds were detected in shallow samples from four of the eight soil borings. With the exception of ethylbenzene and xylene concentrations in sample SB08-05, all detected concentrations for BTEX were below 1,000 micrograms per kilogram (µg/kg). Although ethylbenzene and/or xylenes were also detected in deep samples from three of the eight soil borings, all detected concentrations were below 1,000 mg/kg (DOE/NV, 1996e).

Three of the eight shallow soil samples collected from the mud pits adjacent to Well R-EX contained elevated levels of barium, chromium, and lead. The maximum detected concentrations for total RCRA metals analysis were 3,990 mg/kg of barium in SB05-02, 112 mg/kg of chromium in SB06-21/13, and 119 mg/kg of lead in SB07-18/22-01 (DOE/NV, 1996e). However, the results of the TCLP analysis showed that no RCRA metals concentrations were above the maximum concentration of contaminants.

No nuclear test-derived man-made radionuclides were detected, and no unusual radiological measurements were detected (DOE/NV, 1996e).

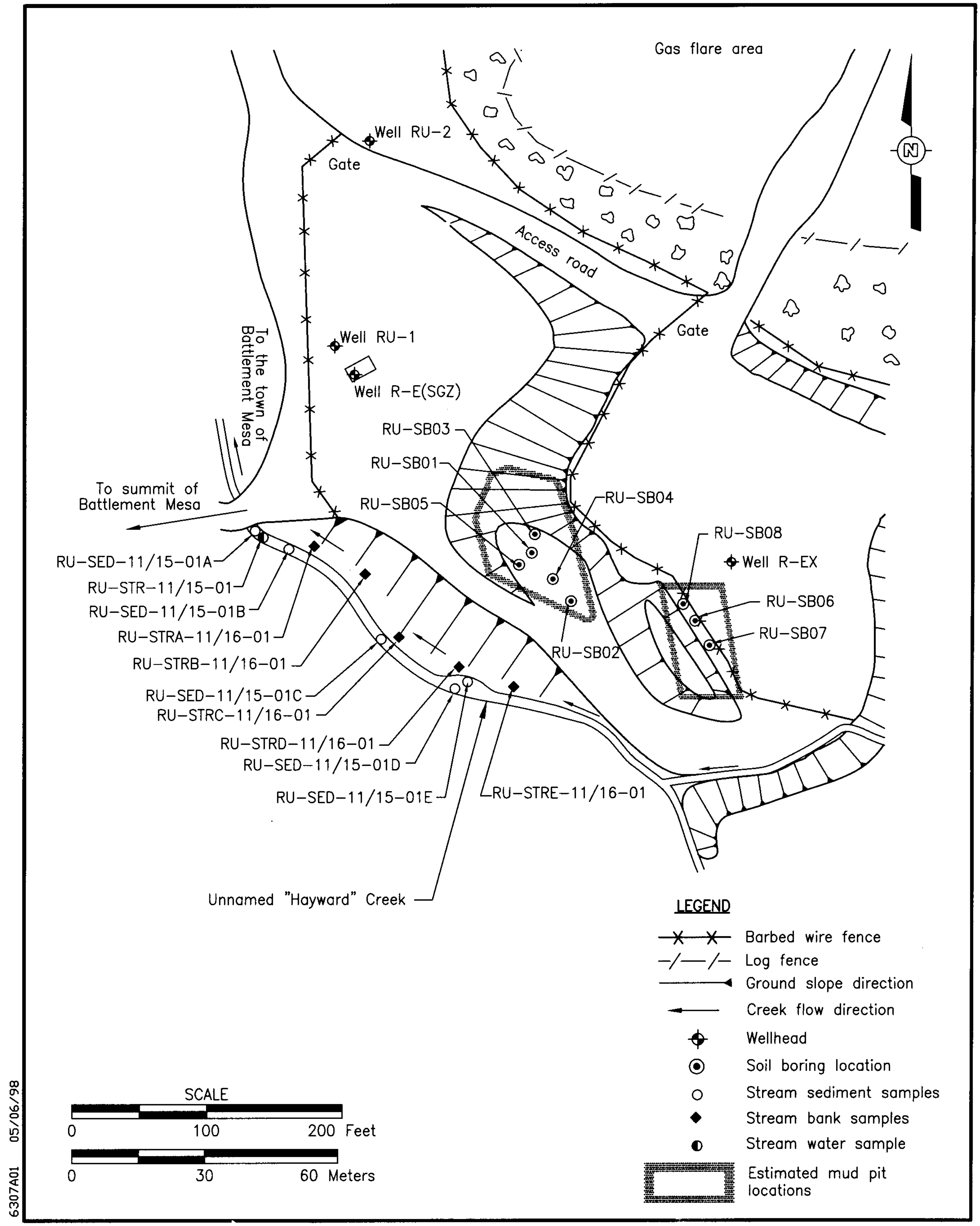


Figure 2-1
Surface Ground Zero Area Soil Boring and Stream Sample Locations

Analytical data from the mud pit soils was used to develop a human health risk assessment for the SGZ area soils. The risk assessment was included in the *Rulison Site Corrective Action Report* (DOE/NV, 1996e). Because the subsurface contamination found in the R-EX mud pit subsurface soils would not pose an undue risk to human health, and because there is no evidence that contaminants have migrated from the soils to the groundwater of the adjacent stream, no further action is proposed for the SGZ area soils.

Total petroleum hydrocarbon was not detected in any of the stream samples, and metals concentrations do not appear to be elevated. This suggests that contamination has not migrated via saturated and unsaturated transport to the stream from the R-EX mud pits.

Nine locations were sampled for the radiological investigation. One was in the vicinity of Well R-EX and eight were located in the gas flare area downwind of the flare stack (Figure 2-2). The radiological investigation soil samples were analyzed for gross alpha, gross beta, tritium, carbon-14, and gamma spectroscopy. Gross alpha ranged from 6.40 picocuries per gram (pCi/g) to 17.2 pCi/g. Gross beta ranged from 24.8 pCi/g to 43.4 pCi/g. Tritium values ranged from -0.020 pCi/g to 0.0007 pCi/g. Carbon-14 values ranged from -0.0186 pCi/g to 0.0749 pCi/g. All radionuclides detected through gamma spectroscopy were naturally occurring isotopes, and no unusual elevations were detected (DOE/NV, 1996e).

2.2 Variances from Approved Work Plans

Deviations from the *Rulison Drilling Effluent Pond Corrective Action Plan* (CAP) (DOE/NV, 1996a), *Verification Sampling and Analysis Plan for Sediment and Water Sampling, Rulison Drilling Effluent Pond* (VSAP) (DOE/NV, 1996d), and *Rulison Drilling Effluent Pond Site Long-Term Groundwater Monitoring Plan* (DOE/NV, 1996b) were originally included in the *Rulison Site Corrective Action Report* (DOE/NV, 1996e) and are included in this report in Appendix D.

Variances from the Long-Term Groundwater Monitoring Plan (DOE/NV, 1996b) that occurred during the eight quarterly groundwater sampling events are as follows. During the first and second quarter 1996 sampling events, the parameter of total suspended solids and total dissolved solids were inadvertently excluded. Also, during the first two quarters the samples were analyzed for dissolved RCRA metals rather than the specified total RCRA metals.

The result of not having total suspended solids (TSS) and total dissolved solids (TDS) data during the first and second quarter 1996, resulted in no significant impact to the project.

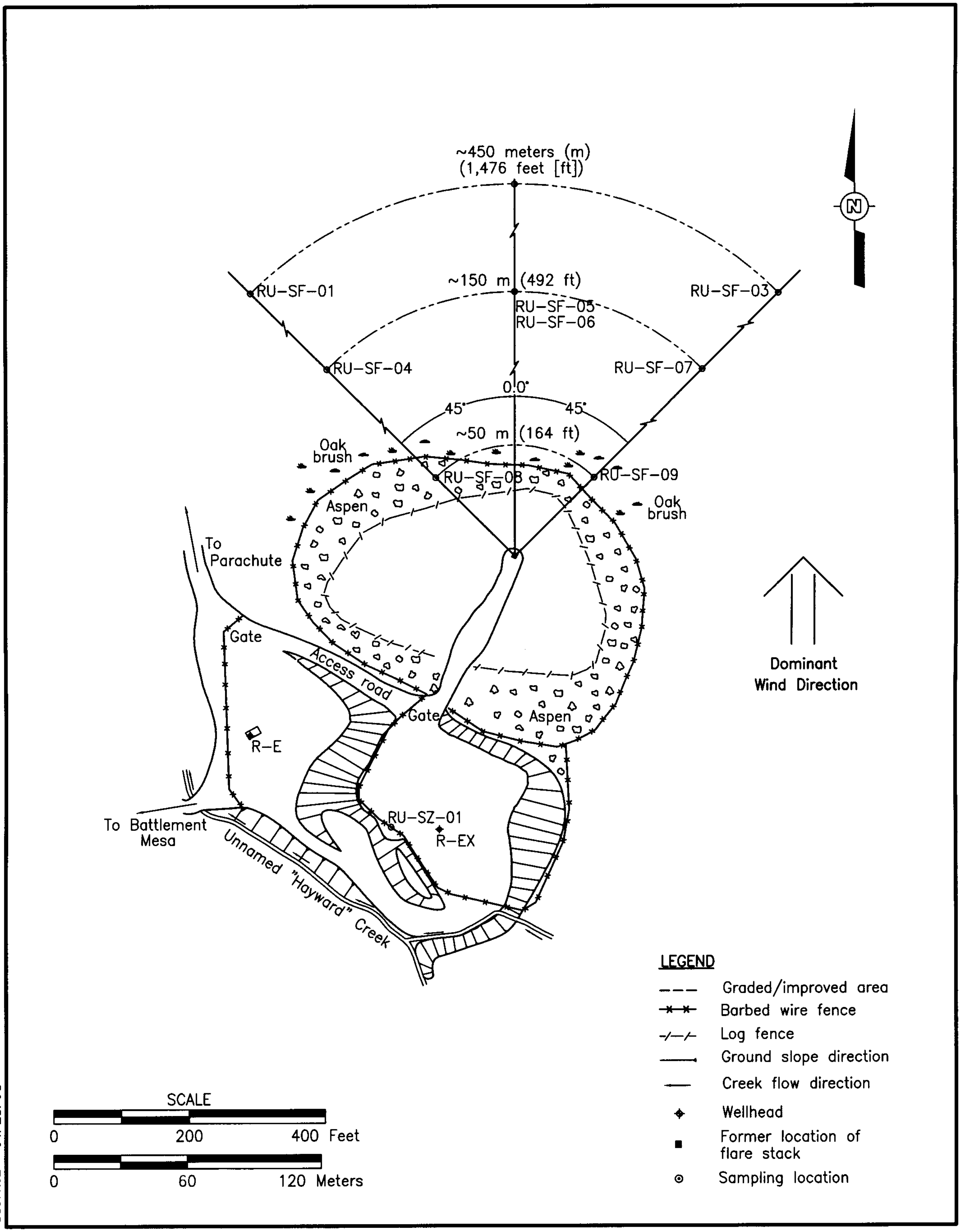


Figure 2-2
Radiological Sampling Locations in the Gas Flare Area

Analyzing for dissolved RCRA metals rather than the specified total RCRA metals may have resulted in having a lower value for metals than may have actually been present. Subsequent sampling events showed no significant increase in metals concentrations, and this posed no significant impact to the project.

2.3 Corrective Action Schedule as Completed

Figure 2-3 shows the schedule of activities conducted in order to complete closure of the Rulison Site Surface.

Activity	Start	Finish
Mobilize to site.	01AUG95	
Remove fish from pond.	02AUG95	11AUG95
Drain pond and construction dewatering.	02AUG95	19OCT95
Excavate and stabilize contaminated soil.	16AUG95	08NOV95
Verification sampling.	07SEP95	08NOV95
Transport soil to landfill.	24AUG95	08NOV95
Surface Ground Zero Investigation.	06OCT95	16NOV95
Install & develop groundwater monitoring wells.	13SEP95	23OCT95
Perform Aquifer Tests.	13NOV95	17NOV95
Restore pond and surrounding area.	08NOV95	25NOV95
Demobilize from site.		25NOV95
First quarter groundwater monitoring 1996	10APR96	11APR96
Second quarter groundwater monitoring 1996	04JUN96	05JUN96
Third quarter groundwater monitoring 1996	10SEP96	10SEP96
Trout Habitat Study		10SEP96
Fourth quarter groundwater monitoring 1996	03DEC96	04DEC96
First quarter groundwater monitoring 1997	27MAR97	27MAR97
Second quarter groundwater monitoring 1997	12JUN97	12JUN97
Third quarter groundwater monitoring 1997	21AUG97	21AUG97
Fourth quarter groundwater monitoring 1997	06NOV97	06NOV97

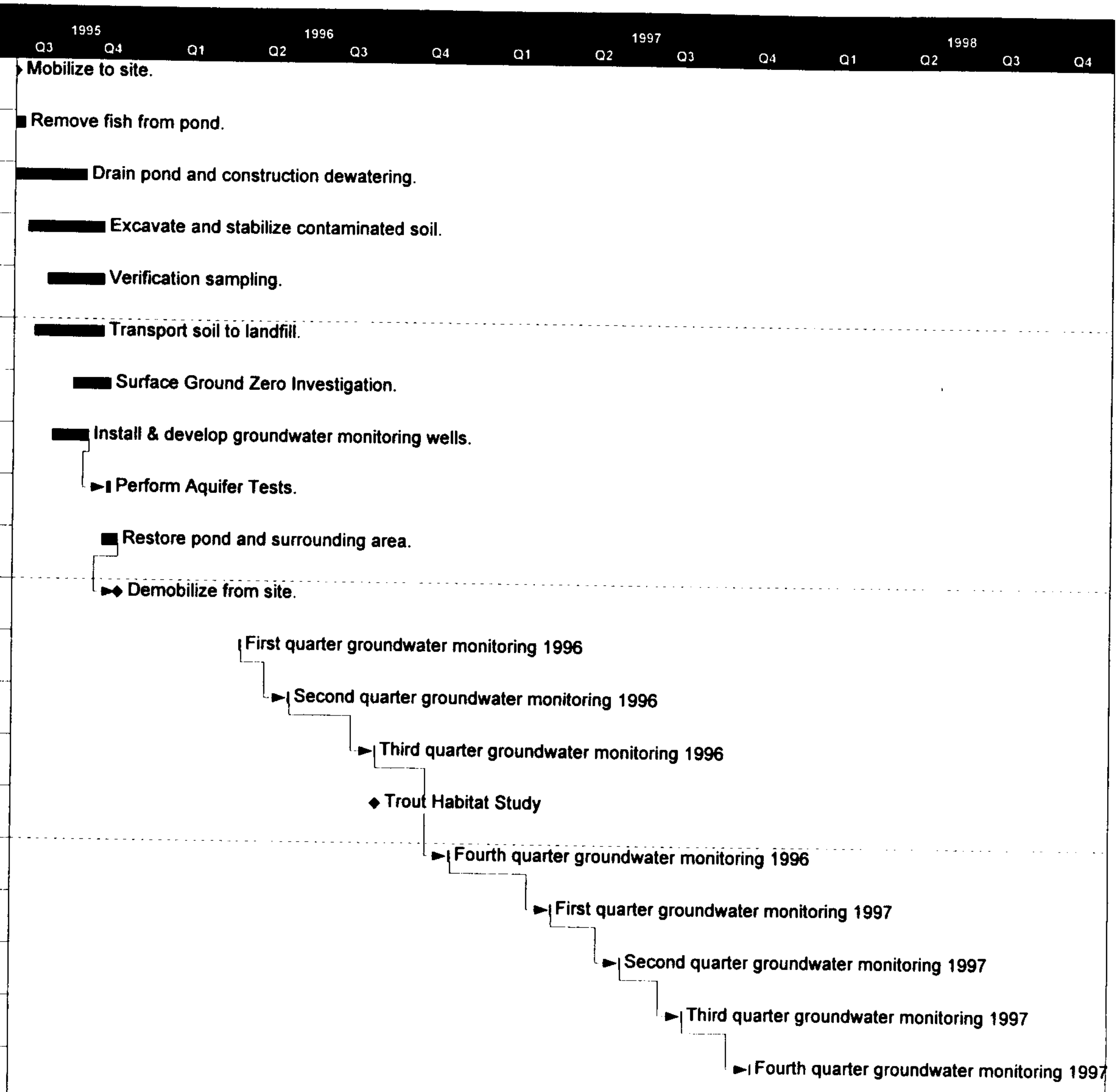


Figure 2-3
Rulison Corrective Action Schedule
As Completed

3.0 Closure Verification Results

This section details the results from sampling the soil from the bottom of the Rulison Drilling Effluent Pond, the results of sampling water from Wells RU-01 and RU-02, and the results of the two-year quarterly groundwater sampling effort.

3.1 Drilling Effluent Pond

Verification samples were collected from the floor of the Rulison drilling effluent pond to confirm that the TPH concentrations were below the 1,000 mg/kg cleanup criterion. It is estimated that approximately 520 m^3 (620 yd^3) of sediment with TPH concentrations greater than 250 mg/kg, but less than or equal to 1,000 mg/kg, remain in the soil under the pond. These verification results are included in Appendix E. This volume is not continuous, but is spread across ten separate areas in the pond bottom. See Figure 3-1 for areas of sediment with TPH concentrations between 250 mg/kg and 1,000 mg/kg (DOE/NV, 1996e).

3.2 Groundwater Monitoring

Seven groundwater monitoring wells were installed at the site as part of the pond cleanup operation and SGZ area investigation. The monitoring well locations are shown on Figure 1-2. Wells RU-01 and RU-02 were installed hydraulically downgradient of Well R-E to monitor for potential contaminant migration from the SGZ area. Monitoring Well RU-03 was installed upgradient from the drilling effluent pond to obtain upgradient water quality information. Monitoring wells RU-05, RU-06A, RU-07, and RU-08 were installed downgradient from the pond to monitor for potential contaminant migration from the pond (DOE/NV, 1996a).

3.2.1 Wells RU-01 and RU-02

During the pond cleanup operation and SGZ area investigation one round of groundwater samples was collected from the newly installed wells. The TPH and BTEX compounds were not detected in RU-01 or RU-02, with the exception of 1.5 micrograms per liter (µg/L) of total xylenes in RU-02. In addition, with the exception of barium, which may be of local natural origin, none of the potential contaminants identified in the SGZ area soil boring samples were detected in the groundwater samples. The site's topography and the quarterly groundwater monitoring suggest that the groundwater gradient is toward the northwest, therefore wells RU-01 and RU-02 are hydrologically downgradient from the R-EX mudpits. This suggests that contaminants have not migrated from the R-EX mud pits into the groundwater. Since there was no evidence of migration of hydrocarbon constituents from the SGZ area, groundwater sampling of RU-01 and RU-02 was not included in the two-year, quarterly sampling program.

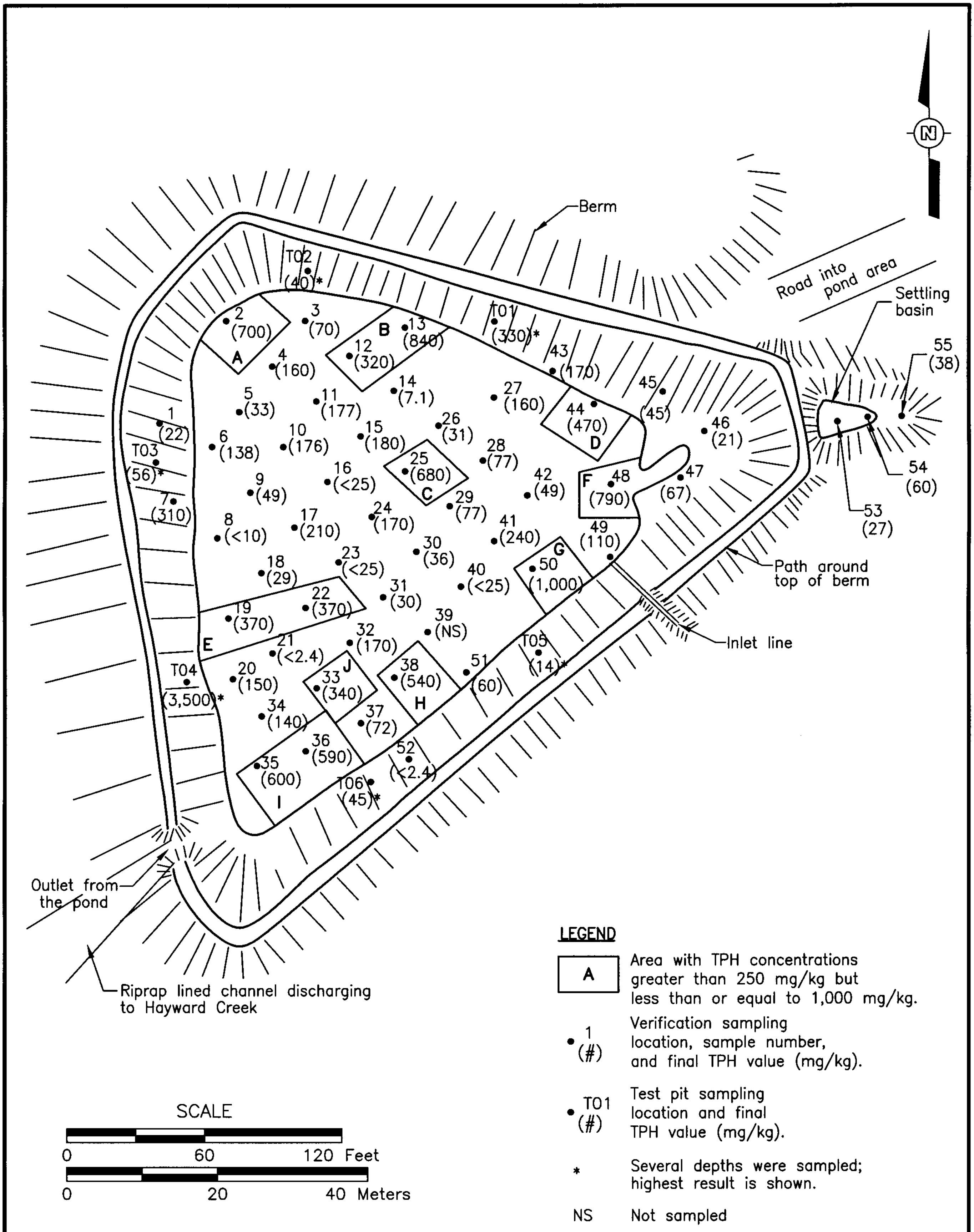


Figure 3-1
Areas of Sediment with TPH Concentration Between 250 mg/kg and 1,000 mg/kg

3.2.2 Quarterly Groundwater Monitoring

The agreement between DOE and CDPHE to increase the TPH cleanup criterion from 250 mg/kg to 1,000 mg/kg was stipulated on the requirement that the groundwater around the drilling effluent pond be monitored on a quarterly basis to demonstrate that contamination was not migrating from the pond. Groundwater from wells RU-03, RU-05, RU-06A, RU-07, and RU-08 was sampled quarterly, providing there was a sufficient volume of water, to monitor for potential contaminant migration from the pond. The sample results were reported after each sampling event in a report. Seven reports titled *Rulison Site Groundwater Monitoring Report, First and Second Quarters, 1996* (DOE/NV, 1996f) through the *Rulison Site Groundwater Monitoring Report, Fourth Quarter, 1997* (DOE/NV, 1997a-e; DOE/NV, 1998) were completed. The analytical results of the eight quarterly sampling events are summarized in this report and groundwater elevation and concentration trends are discussed.

3.2.2.1 Groundwater Flow Direction and Elevation

Groundwater elevations were measured during each quarterly sampling event and are summarized on Table 3-1. Groundwater flow direction was consistent with topography, and generally flowed in a northwesterly direction. Figure 3-2 compares the groundwater elevations in the wells during each quarterly sampling event. Highest groundwater elevations were in the spring, while lowest groundwater elevations were in the autumn. The greatest groundwater elevation fluctuation was 9.12 m (29.92 ft) and was observed in RU-3. Well RU-07 was dry through all eight quarterly sampling events and no samples were collected.

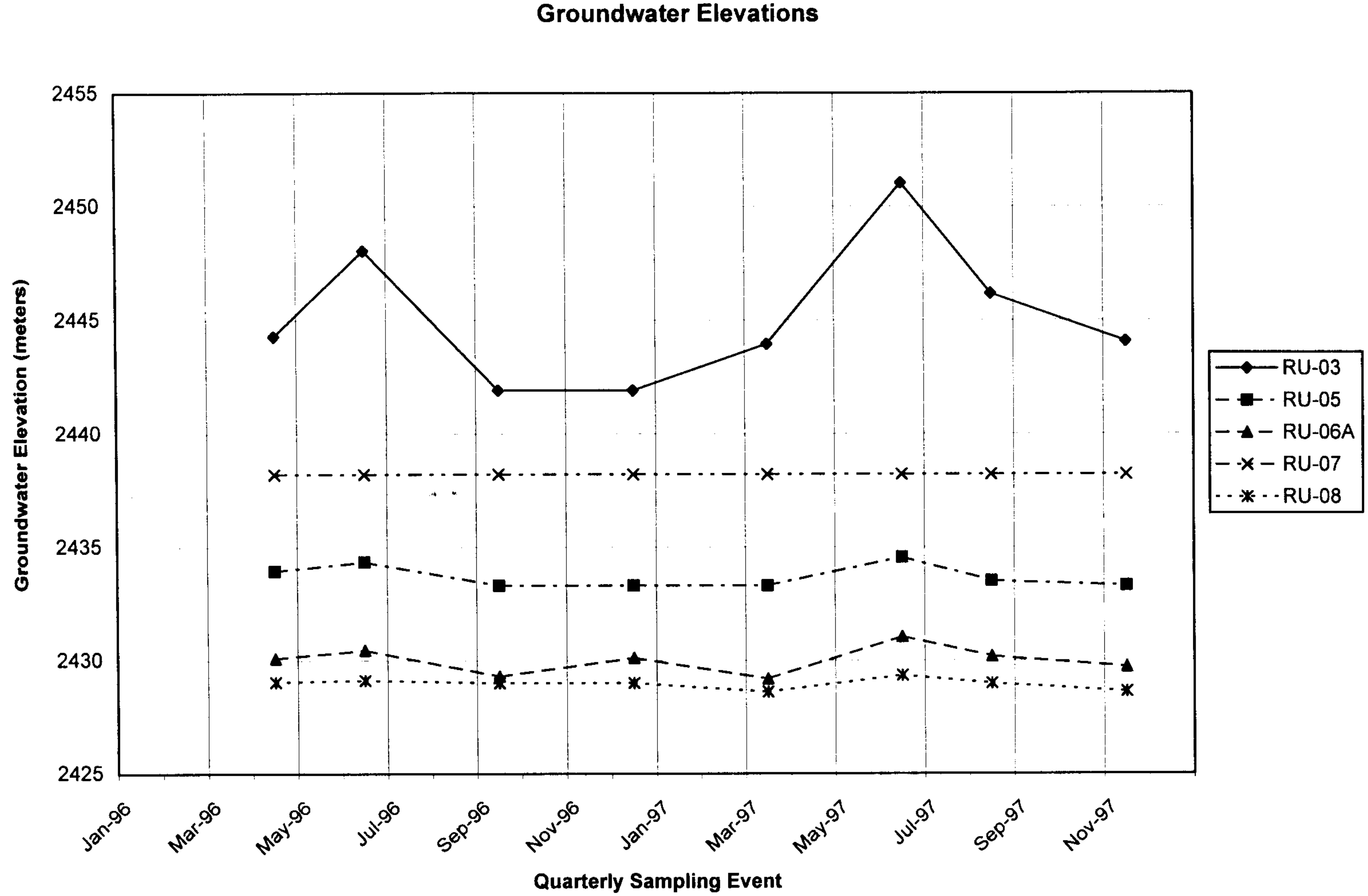
3.2.2.2 Analytical Results

Analytical results for the eight quarterly monitoring events are summarized in the following paragraphs and presented on Table 3-2. Figures 3-3 to 3-6 graphically compare the constituents detected in wells RU-03, RU-05, RU-06A, and RU-08, along with the groundwater elevation for each quarter. No trends or correlations between groundwater elevation and concentrations of chemical constituents could be determined. There are no figures for Well RU-07, since this well was dry. Figures 3-7 to 3-10 graphically compare the levels of barium, chromium, lead, and selenium detected in each well over the monitoring period. Table 1.6-1 of the Risk Assessment (DOE/NV, 1996e) summarized the groundwater risk-based trigger levels for BTEX, barium, chromium III, chromium VI, lead, and TPH diesel. These trigger levels will be discussed in relation to the analytical results obtained during the quarterly sampling in the following section. Appendix F includes the laboratory certifications and analytical results for each quarterly sampling event.

Table 3-1
Rulison Site Groundwater Elevations
First Quarter 1996 to Fourth Quarter 1997

Well	First Quarter 1996	Second Quarter 1996	Third Quarter 1996	Fourth Quarter 1996	First Quarter 1997	Second Quarter 1997	Third Quarter 1997	Fourth Quarter 1997
Depth to Water (from top of casing)								
RU-03	10.56 m (34.65 ft)	6.81 m (22.33 ft)	12.94 m (42.44 ft)	12.93 m (42.42 ft)	10.90 m (35.75 ft)	3.82 m (12.52 ft)	8.68 m (28.48 ft)	10.78 m (35.36 ft)
RU-05	2.35 m (7.71 ft)	1.96 m (6.42 ft)	Dry	Dry	Dry	1.75 m (5.75 ft)	2.79 m (9.15 ft)	Dry
RU-06A	4.74 m (15.56 ft)	4.38 m (14.38 ft)	5.55 m (18.20 ft)	4.72 m (15.5 ft)	5.66 m (18.56 ft)	3.79 m (12.45 ft)	4.67 m (15.32 ft)	5.12 m (16.8 ft)
RU-07	Dry[a]	Dry	Dry	Dry	Dry	Dry	Dry	Dry
RU-08	1.78 m (5.85 ft)	1.70 m (5.58 ft)	Dry	Dry	Dry	1.49 m (4.9 ft)	1.84 m (6.04 ft)	2.05 m (6.73 ft)
Groundwater Elevation								
RU-03	2444.29 m (8019.33 ft)	2448.05 m (8031.65 ft)	2441.92 m (8011.54 ft)	2441.92 m (8011.56 ft)	2443.96 m (8018.23 ft)	2451.04 m (8041.46 ft)	2446.17 m (8025.5 ft)	2444.08 m (8018.62 ft)
RU-05	2433.95 m (7985.41 ft)	2434.35 m (7986.70 ft)	< 2433.39 m (< 7983.55 ft)	< 2433.39 m (< 7983.55 ft)	<2433.39 m (<7983.55 ft)	2434.55 m (7987.37 ft)	2433.51 m (7983.97 ft)	< 2433.39 m (< 7983.55 ft)
RU-06A	2430.10 m (7972.78 ft)	2430.46 m (7973.96 ft)	2429.30 m (7970.14 ft)	2430.12 m (7972.84 ft)	2429.19 m (7969.78 ft)	2431.05 m (7975.89 ft)	2430.18 m (7973.02 ft)	2429.72 m (7971.54 ft)
RU-07	<2438.22 m[b] (<7999.40 ft)	<2438.22 m (<7999.40 ft)	<2438.22 m (<7999.40 ft)	<2438.22 m (<7999.40 ft)	<2438.22 m (<7999.40 ft)	< 2438.22 m (< 7999.40 ft)	<2438.22 m (<7999.40 ft)	<2438.22 m (<7999.40 ft)
RU-08	2429.05 m (7969.33 ft)	2429.13 (7969.60 ft)	< 2429.01 m (< 7969.18 ft)	< 2429.01 m (< 7969.18 ft)	2428.61 m (7967.88 ft)	2429.34 m (7970.26 ft)	2428.99 m (7969.14 ft)	2428.63 m (7967.94 ft)

[a]Well had less than 1 foot of water, so it was considered dry and was not sampled.
[b]<2438.22 m indicates that the groundwater was less than the elevation of the bottom of the well.



Well RU-05 was dry during the 3rd and 4th quarter 1996, and 1st and 4th quarters 1997.
Well RU-07 was dry, depth to bottom of well shown for all sampling events.
Well RU-08 was dry during the 3rd and 4th quarters 1996, and 1st quarter of 1997.

Figure 3-2
Rulison Site Comparison of Groundwater Elevations from Quarterly Monitoring

Table 3-2
Rulison Site Groundwater Analytical Results
First Quarter 1996 to Fourth Quarter 1997
(All results in µg/L)
(Page 1 of 3)

Well	First Quarter 1996	Second Quarter 1996	Third Quarter 1996	Fourth Quarter 1996	First Quarter 1997	Second Quarter 1997	Third Quarter 1997	Fourth Quarter 1997
TPH - Diesel								
RU-03	100U	94U	500U	500U	1000U	1000U	1000U	940U
RU-05	100UJ	94U	NS	NS	NS	1100U	1000U	NS
RU-06A	100U	71R	500U	500U	1000U	1000U	1000U	940U
RU-07	NS	NS	NS	NS	NS	NS	NS	NS
RU-08	100UJ	94U	NS	NS	NS	1300U	1000U	940U
Benzene								
RU-03	0.5U	0.5U	1U	1U	1U	0.50U	2.5	1.0U
RU-05	0.5U	0.5U	NS	NS	NS	0.50U	1.0U	NS
RU-06A	0.5U	0.5U	1U	1U	1U	0.50U	1.0U	1.0U
RU-07	NS	NS	NS	NS	NS	NS	NS	NS
RU-08	0.5U	0.5U	NS	NS	NS	0.50U	1.0U	1.0U
Toluene								
RU-03	0.5U	0.5U	1U	1U	1U	1.0U	3.9	1.0U
RU-05	0.5U	0.5U	NS	NS	NS	1.0U	1.0U	NS
RU-06A	0.5U	0.5U	1U	1U	1U	1.0U	1.0U	1.0U
RU-07	NS	NS	NS	NS	NS	NS	NS	NS
RU-08	0.5U	0.5U	NS	NS	NS	1.0U	1.0U	1.0U
Ethylbenzene								
RU-03	0.5U	0.5U	1U	1U	1U	1.0U	1.0U	1.0U
RU-05	0.5U	0.5U	NS	NS	NS	1.0U	1.0U	NS
RU-06A	0.5U	0.5U	1U	1U	1U	1.0U	1.0U	1.0U
RU-07	NS	NS	NS	NS	NS	NS	NS	NS
RU-08	0.5U	0.5U	NS	NS	NS	1.0U	1.0U	1.0U

Table 3-2
Rulison Site Groundwater Analytical Results
First Quarter 1996 to Fourth Quarter 1997
(All results in µg/L)
(Page 2 of 3)

Well	First Quarter 1996	Second Quarter 1996	Third Quarter 1996	Fourth Quarter 1996	First Quarter 1997	Second Quarter 1997	Third Quarter 1997	Fourth Quarter 1997
Xylenes (total)								
RU-03	0.5U	0.5U	1U	1U	1U	1.0U	2.0U	2.0U
RU-05	0.5U	0.5U	NS	NS	NS	1.0U	2.0U	NS
RU-06A	0.5U	0.5U	1U	1U	1U	1.0U	2.0U	2.0U
RU-07	NS	NS	NS	NS	NS	NS	NS	NS
RU-08	0.5U	0.5U	NS	NS	NS	1.0U	2.0U	2.0U
Barium								
RU-03	*120*	*110*	105	135	86	90.3	148.0	155
RU-05	*360*	*120*	NS	NS	NS	89.8	425.0	NS
RU-06A	*120*	*120*	119	116	118	130	114.0	113
RU-07	*NS*	*NS*	NS	NS	NS	NS	NS	NS
RU-08	*350*	*140*	NS	NS	NS	146	127.0	116
Chromium								
RU-03	*10U*	*10U*	1.5U	6.7	2.2	5.0	9.8	9.3
RU-05	*24*	*10U*	NS	NS	NS	1.8	39.2	NS
RU-06A	*10U*	*10U*	1.5U	1.5U	2.5	1.0U	1.0U	4.3
RU-07	*NS*	*NS*	NS	NS	NS	NS	NS	NS
RU-08	*10U*	*10U*	NS	NS	NS	3.1	1.0U	1.3
Lead								
RU-03	*5.6U*	*3U*	1.5	2.3U	2.0U	2.5	6.4	5.3
RU-05	*13U*	*3U*	NS	NS	NS	3.1	18.5	NS
RU-06A	*3U*	*3U*	0.8U	0.8U	2.0U	2.0U	2.0U	2.9
RU-07	*NS*	*NS*	NS	NS	NS	NS	NS	NS
RU-08	*12U*	*3U*	NS	NS	NS	3.5	2.5	2.0U

Table 3-2
Rulison Site Groundwater Analytical Results
First Quarter 1996 to Fourth Quarter 1997
(All results in µg/L)
(Page 3 of 3)

Well	First Quarter 1996	Second Quarter 1996	Third Quarter 1996	Fourth Quarter 1996	First Quarter 1997	Second Quarter 1997	Third Quarter 1997	Fourth Quarter 1997
				Selenium				
RU-03	*16*	*14*	2.8U	2.8U	4.0U	3.0U	3.0U	4.0U
RU-05	*7.2*	*6*	NS	NS	NS	3.0U	3.0U	NA
RU-06A	*12*	*20*	2.8U	2.8U	4.0U	3.0U	3.0U	4.0U
RU-07	*NS*	*NS*	NS	NS	NS	NS	NS	NS
RU-08	*12*	*22*	NS	NS	NS	3.0U	3.0U	5.0U

Values in italics are for the dissolved fraction.
Values in bold are the fourth quarter 1997 sampling event results.

NS = Well dry - no sample collected.
U = Analyte not detected above the specified value.
R = Quality control indicates that the data are unusable (compound may or may not be present).
J = Reported value is estimated.

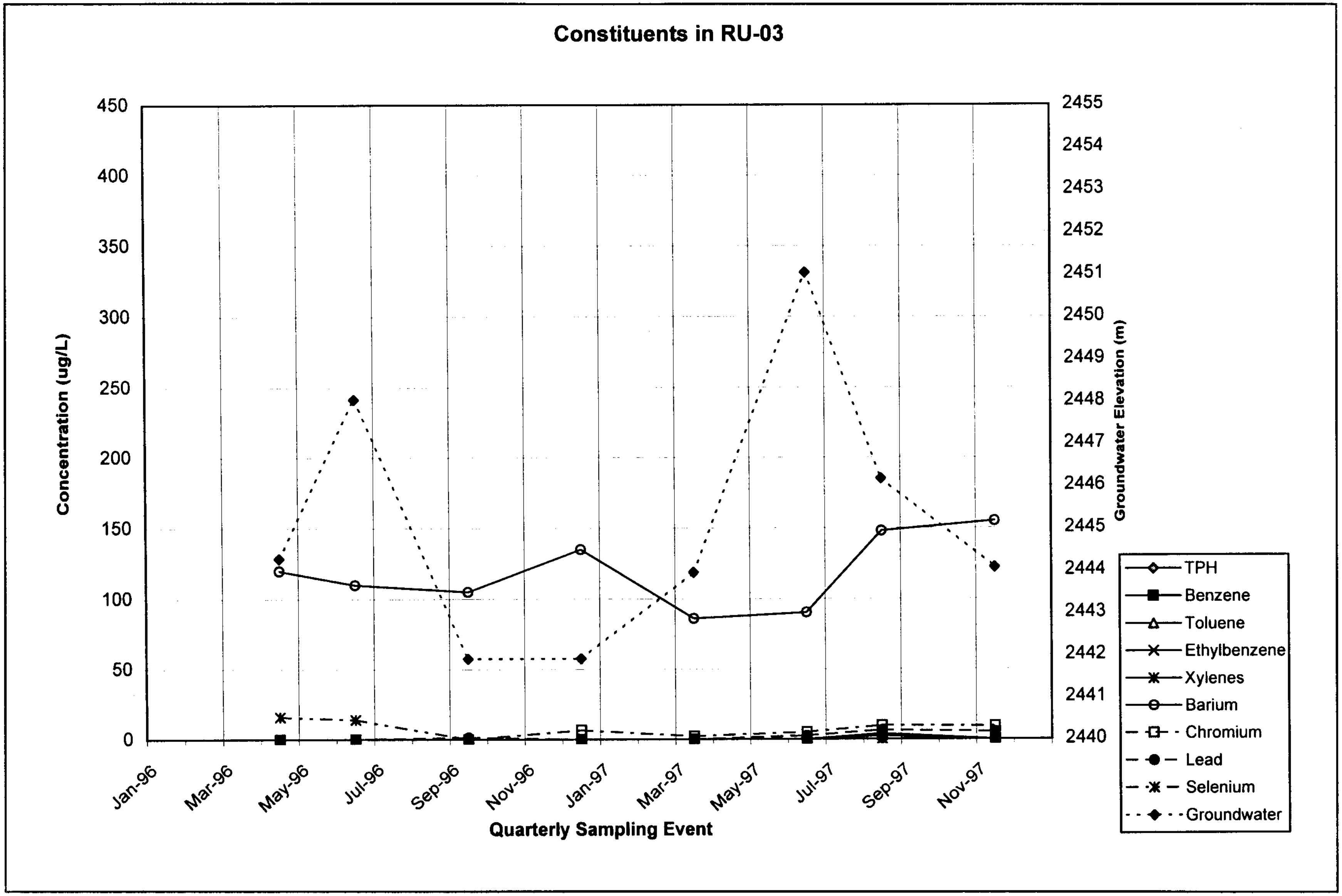


Figure 3-3
Comparison of Constituents and Groundwater Elevations from Quarterly Monitoring for Well RU-03

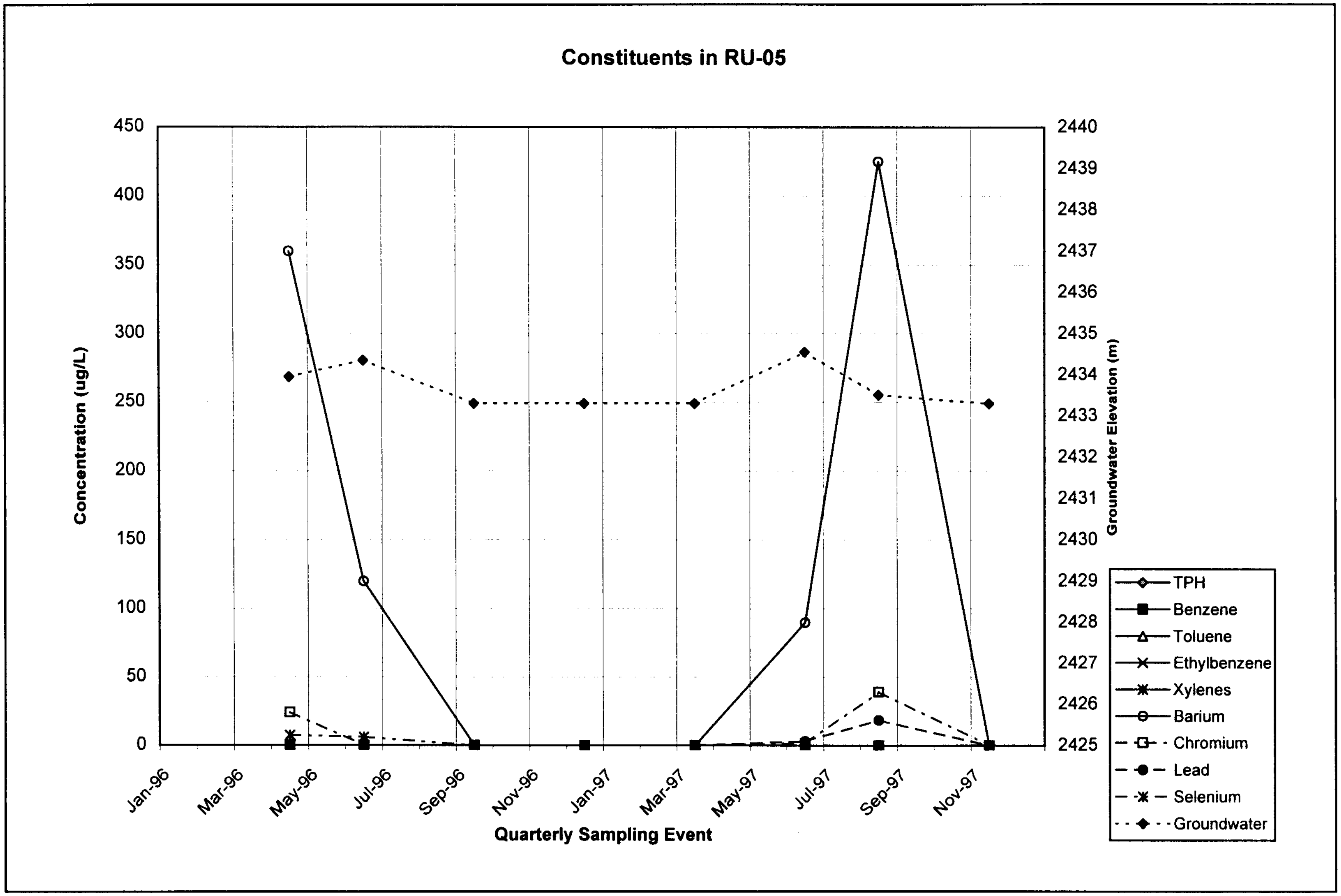


Figure 3-4
Comparison of Constituents and Groundwater Elevations from Quarterly Monitoring for Well RU-05

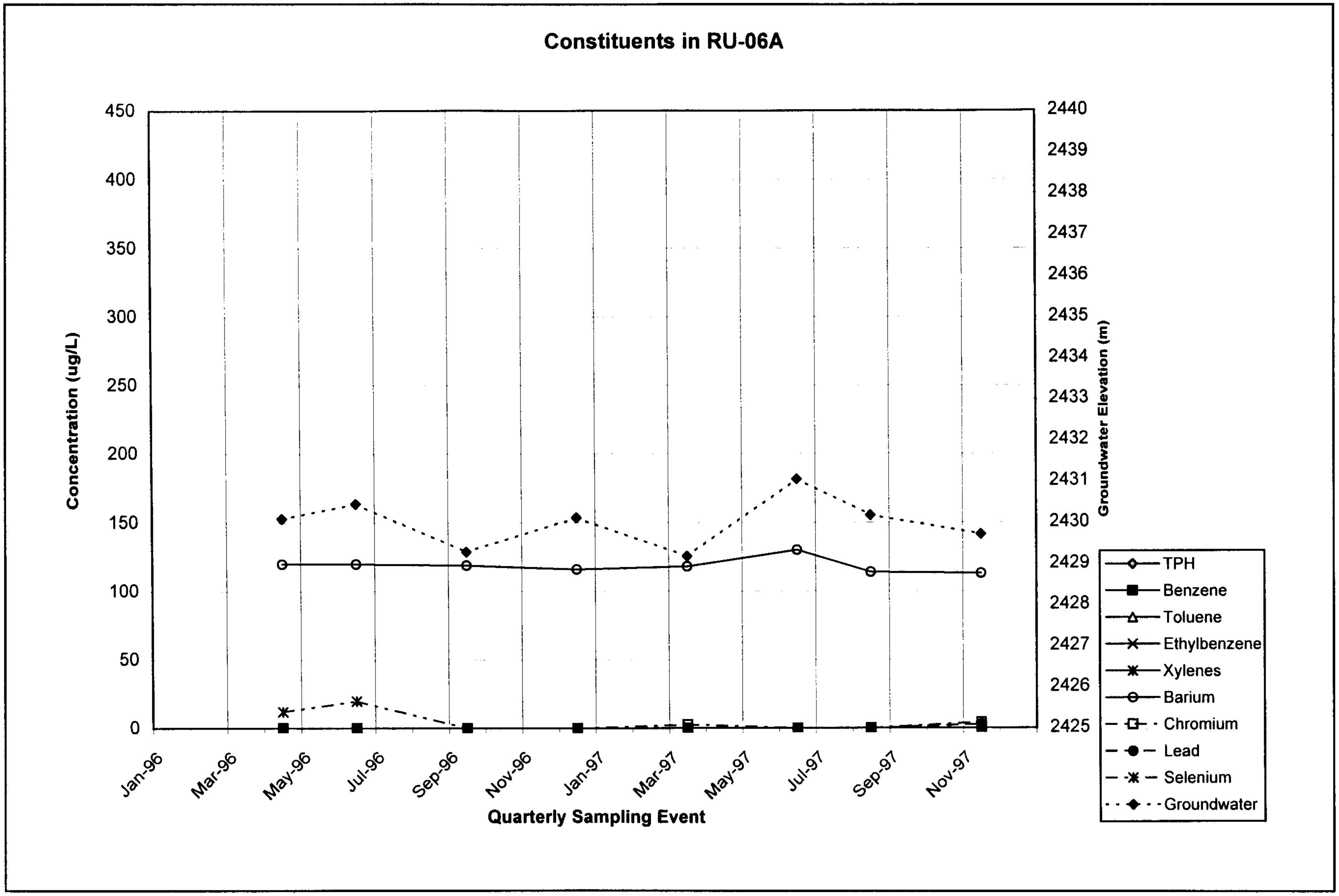


Figure 3-5
Comparison of Constituents and Groundwater Elevations from Quarterly Monitoring for Well RU-06A

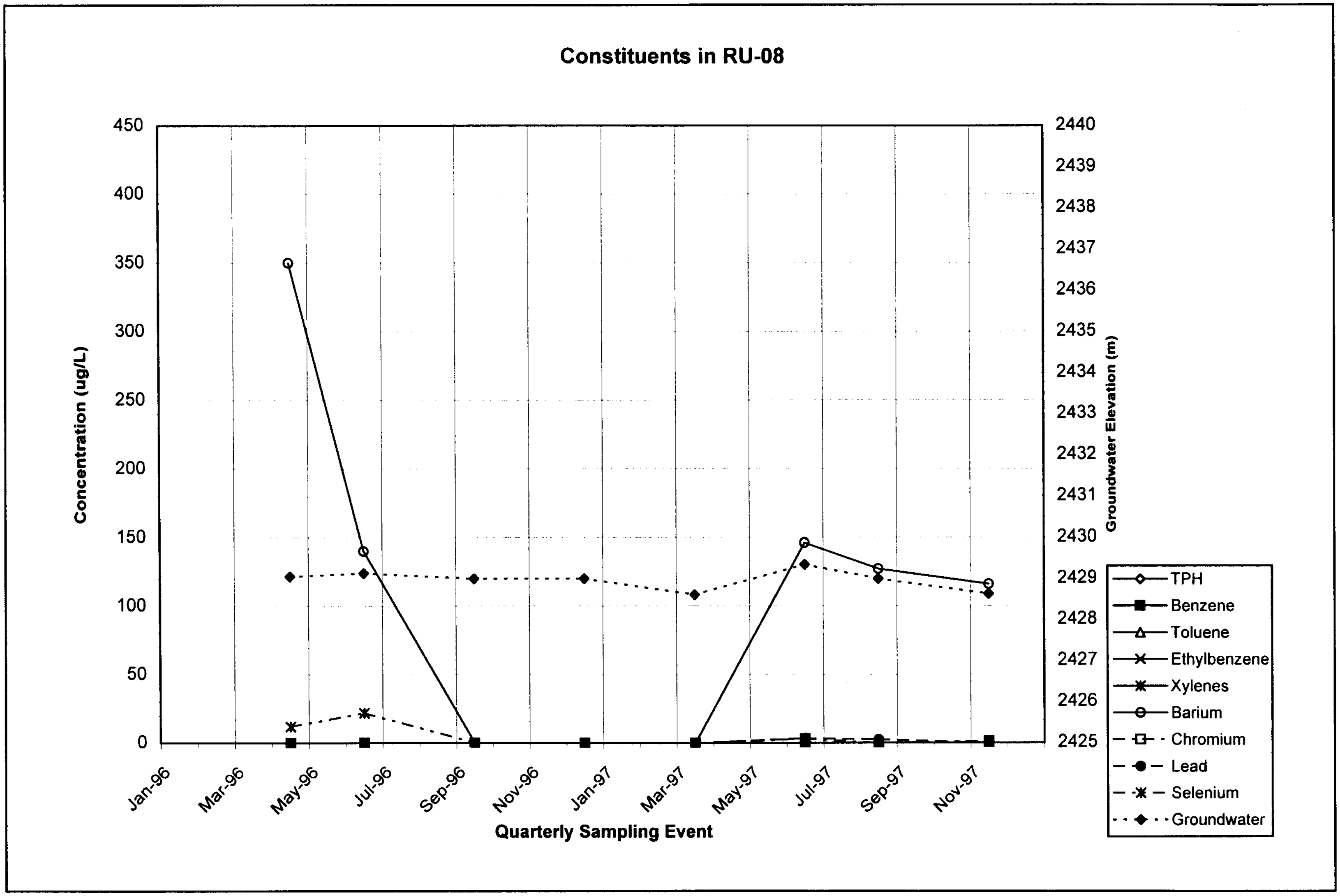
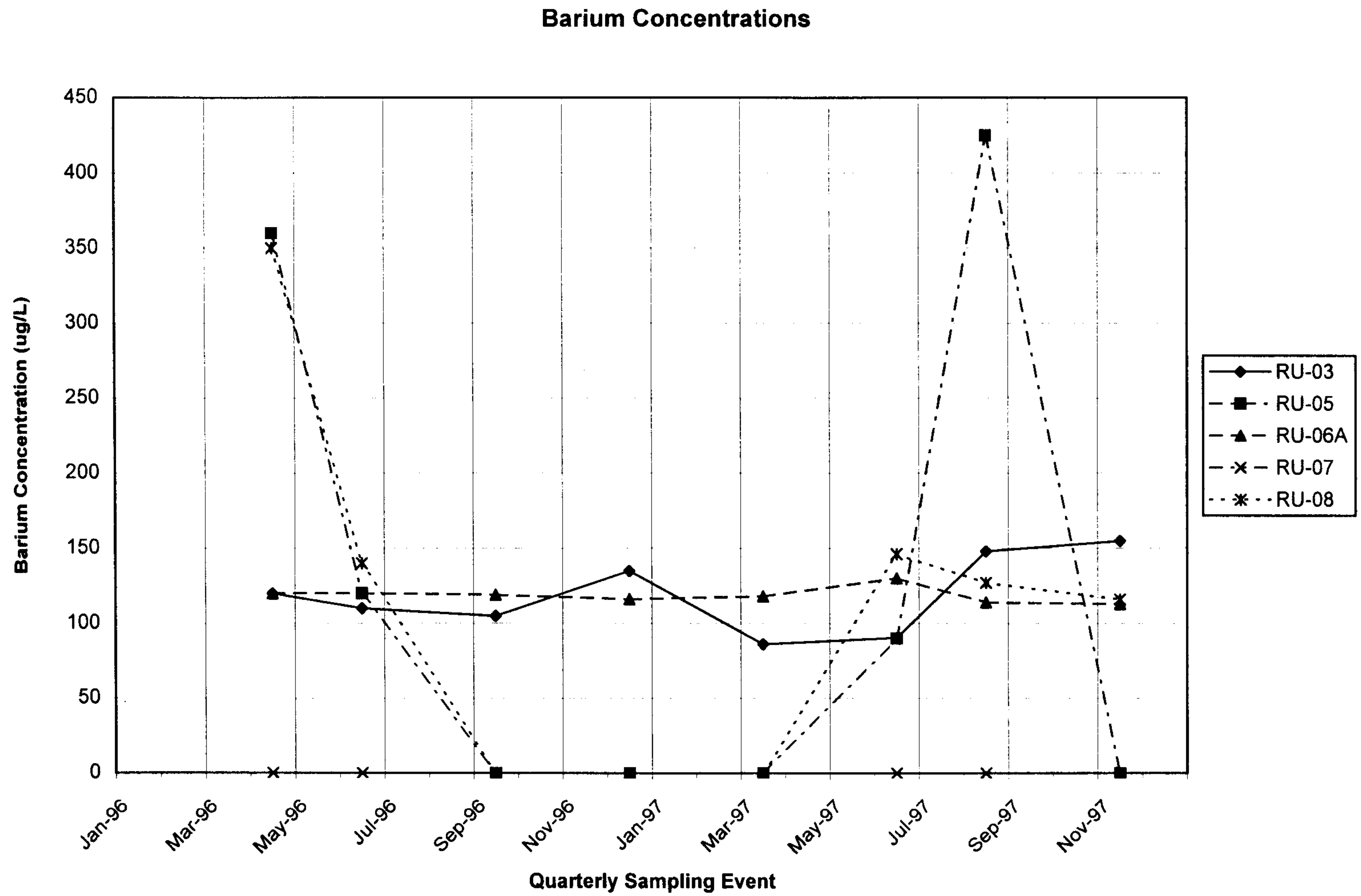


Figure 3-6
Comparison of Constituents and Groundwater Elevations from Quarterly Monitoring for Well RU-08



Well RU-05 was dry during the 3rd and 4th quarter 1996, and 1st and 4th quarters 1997.
Well RU-07 was dry for all eight quarterly monitoring events.
Well RU-08 was dry during the 3rd and 4th quarters 1996, and 1st quarter of 1997.

Figure 3-7
Rulison Site Comparison of Barium Concentrations from Quarterly Monitoring

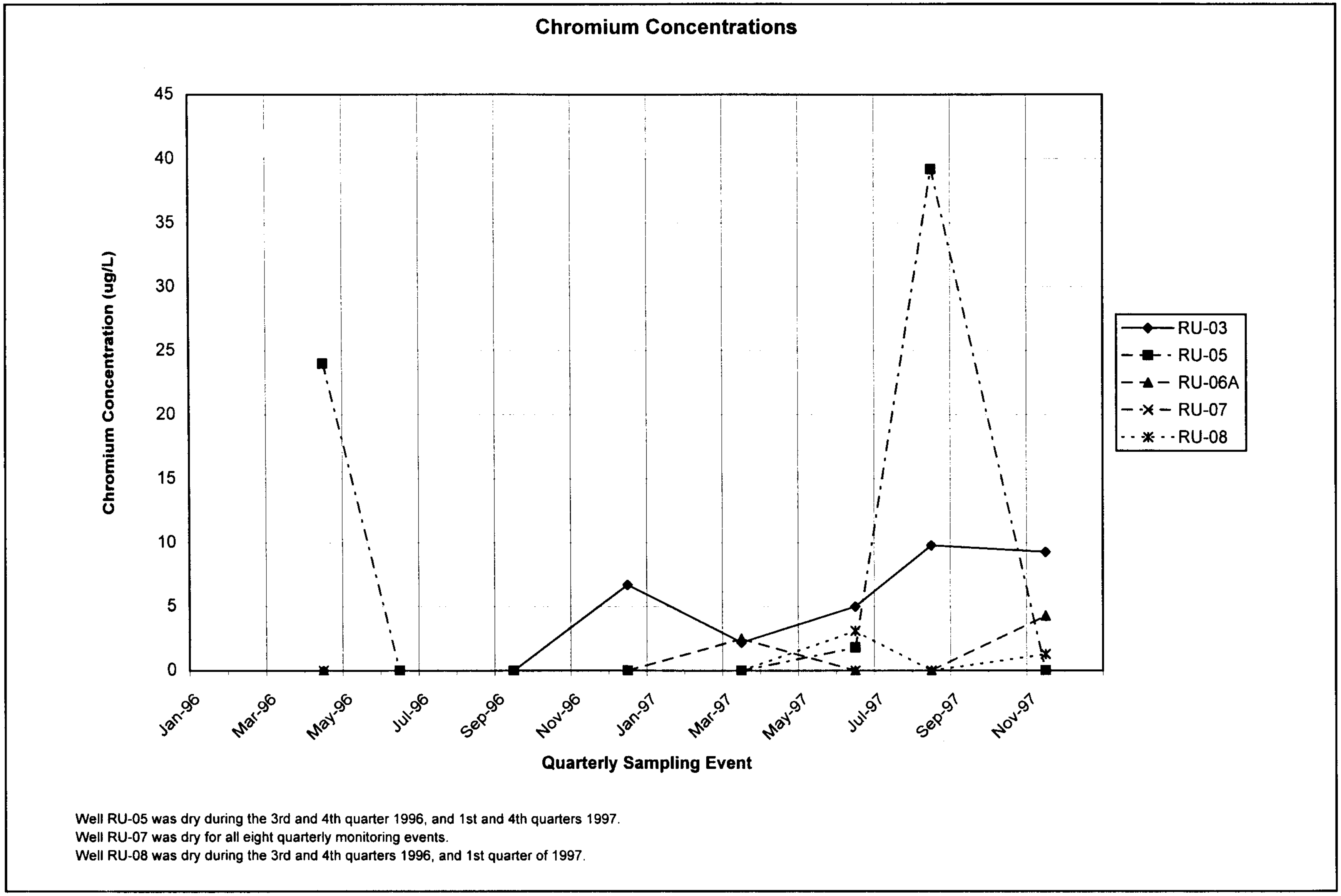
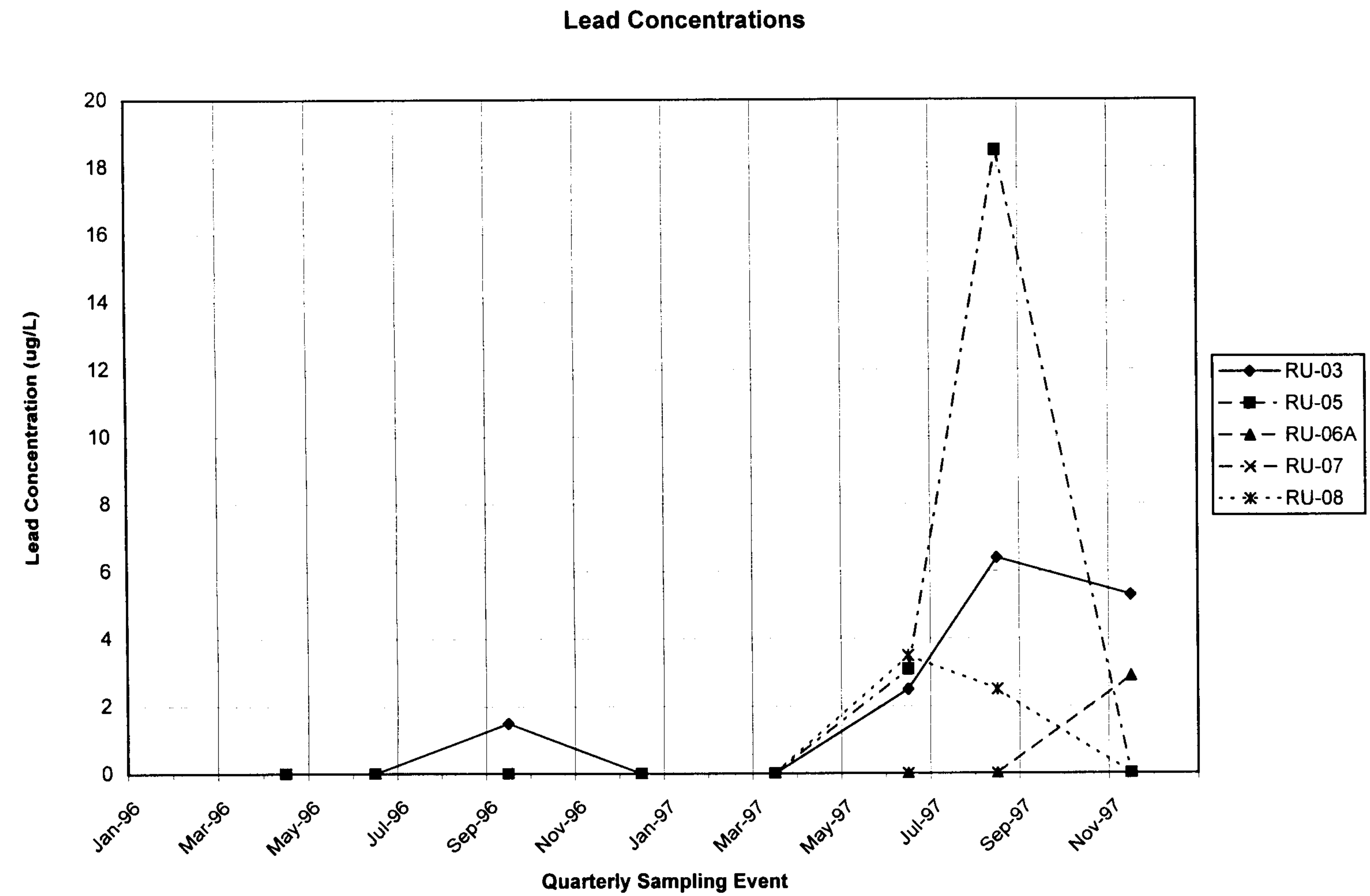
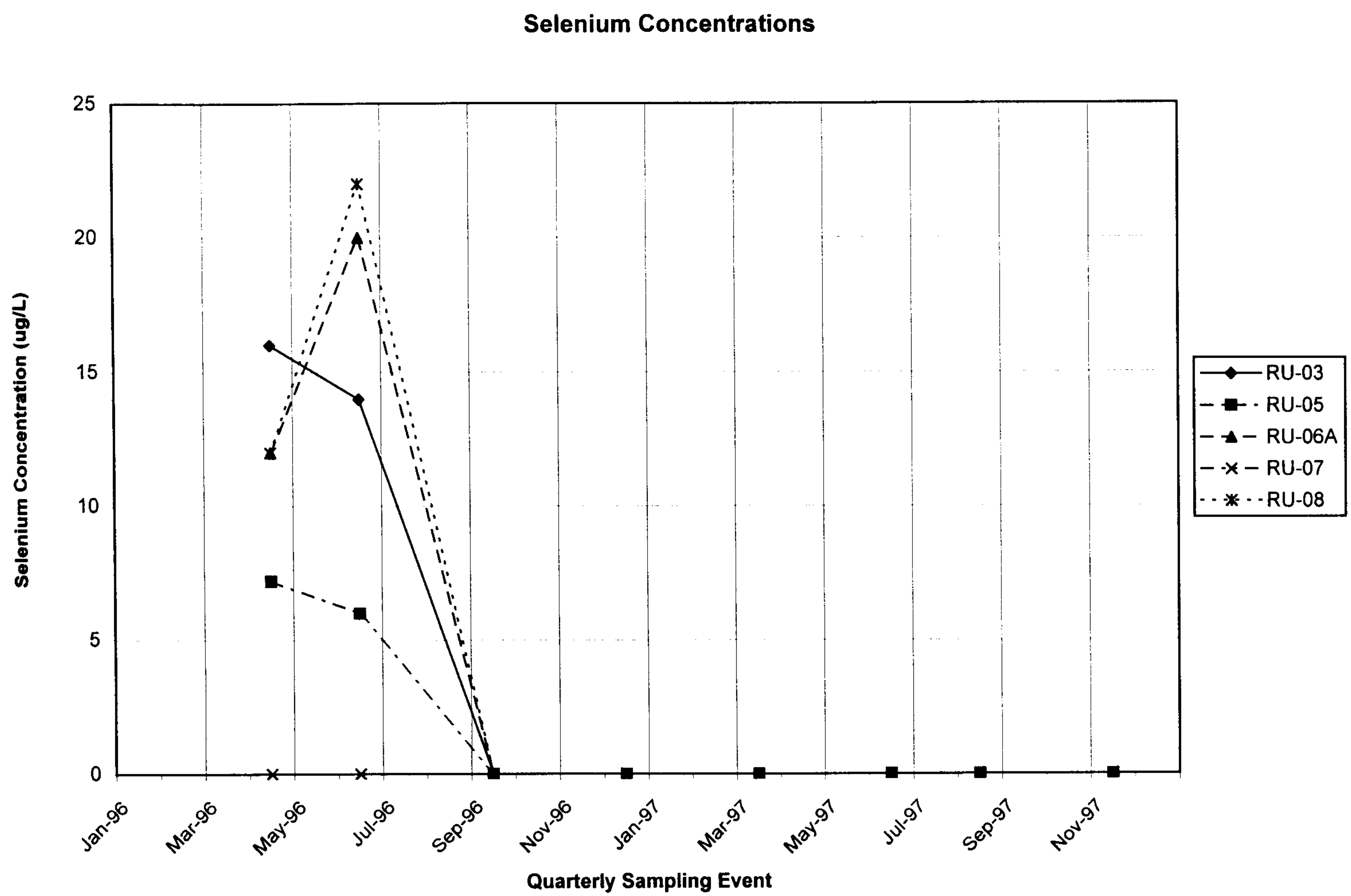


Figure 3-8
Rulison Site Comparison of Chromium Concentrations from Quarterly Monitoring



Well RU-05 was dry during the 3rd and 4th quarter 1996, and 1st and 4th quarters 1997.
Well RU-07 was dry for all eight quarterly monitoring events.
Well RU-08 was dry during the 3rd and 4th quarters 1996, and 1st quarter of 1997.

Figure 3-9
Rulison Site Comparison of Lead Concentrations from Quarterly Monitoring



Well RU-05 was dry during the 3rd and 4th quarter 1996, and 1st and 4th quarters 1997.
Well RU-07 was dry for all eight quarterly monitoring events.
Well RU-08 was dry during the 3rd and 4th quarters 1996, and 1st quarter of 1997.

Figure 3-10
Rulison Site Comparison of Selenium Concentrations from Quarterly Monitoring

The first and second quarter 1996 sampling events used an electric submersible pump to purge and sample the wells. In order to obtain a more representative sample of the groundwater, plastic disposable bailers were used starting with the third quarter 1996 sampling event. This lowered the rate of inflow and reduced the amount of suspended solids drawn in from the surrounding soil.

BTEX Compounds

Benzene, toluene, ethylbenzene, and xylene compounds were not detected in any wells with the exception of a one-time detection of benzene and toluene in up-gradient Well RU-03. Benzene and toluene were only detected during the third quarter 1997 samples from Well RU-03 at concentrations of 2.5 μg/L and 3.9 μg/L, respectively. The source of the benzene and toluene in Well RU-03 is unknown.

The following risk-based trigger levels were established and have been converted from milligrams per liter (mg/L) to μg/L in order to more easily compare them with the results in this report: benzene = 5.2 μg/L, toluene=11,500 μg/L, ethylbenzene=5,800 μg/L, and xylene=116,000 μg/L (DOE/NV, 1996e). No samples exceeded the risk-based trigger levels for BTEX.

Diesel Range TPH

Diesel range TPH was detected once in Well RU-06A during the second quarter 1996 sampling event. However, a Tier II review of the data determined that this detection was most likely the result of laboratory contamination. The value of 71 μg/L was qualified with an "R," which means that quality control has indicated that this data is unusable; the compound may or may not be present. The risk-based trigger level for TPH diesel is 40,300 μg/L (DOE/NV, 1996e). The TPH diesel was not detected in any of the other wells for any of the quarterly sampling events, and therefore no sample exceeded the risk-based trigger level.

Inorganics

As specified in the *Rulison Drilling Effluent Pond Site Long-Term Groundwater Monitoring Plan* (DOE/NV, 1996b), a discussion of the results including statistical methodology used will be included. The upper 95 percent upper confidence limit of the 95th percentile (95 percent of all measurements of a population would be below the 95th percentile value) was established as a tolerance interval for the concentration of each inorganic constituent of potential concern (COPC) for the pond cleanup (barium, chromium, and lead) in the upgradient (background) groundwater (Well RU-03) using procedures for establishing upper confidence limits for quantiles (Gilbert, 1987). Based on Figures 3-7 through 3-10, it appears that there are no significant seasonal variations in the concentrations of these COPCs in the background groundwater, so the data from the eight quarterly sampling events were pooled to establish the tolerance intervals. The tolerance intervals established for barium, chromium, and lead were 200 μg/L, 18.1 μg/L, and 8 μg/L, respectively.

Selenium was not included in the statistical evaluation of background groundwater quality. Following the change in sampling equipment from submersible pumps to disposable bailers for the third quarter 1996 and subsequent sampling events, selenium was not detected in any of the groundwater samples collected from the site.

The quarterly monitoring data from the downgradient wells (RU-05, RU-06A, and RU-08) have been compared statistically against the tolerance intervals established for barium, chromium, and lead. Based on this comparison, the only exceedances of the tolerance intervals were barium and chromium in the first quarter 1996 sample from Well RU-05; and barium, chromium, and lead in the third quarter 1997 sample from Well RU-05. In both cases, the increased concentrations of the COPCs were likely caused by inadvertent entrainment of sediment from the bottom of the well.

To determine if the increased inorganics concentrations were related to sediment uptake in the sample, total (unfiltered) and dissolved (filtered) RCRA metals samples were collected during the fourth quarter 1997 sampling event. These results are compared on Table 3-3. Barium, chromium, and lead were detected in the total (unfiltered) RCRA metals samples. Barium was the only constituent detected in the dissolved (filtered) RCRA metals sample. This would indicate that chromium and lead are not dissolved and are associated with the sediment in the bottom of the wells.

Table 3-4 compares the TDS, TSS, and lead values and provides more evidence to suggest that increased inorganics concentrations are related to increased solids in the sample. Lead was detected in the RCRA total metals sample from RU-06A, although not in the duplicate sample, for the fourth quarter 1997 sampling event. Lead was not detected in either of the RCRA dissolved metals samples for this sampling event. The increased amount of solids in sample RUW00122 is the most probable source for the lead detected in the RCRA total metals sample. The increase in TDS and TSS is slight, but this may be enough to get the very low lead detection in sample RUW00122.

Table 3-3
Rulison Site Comparison of Analytical Results for RCRA Total and Dissolved Metals*
Fourth Quarter 1997
(All results in µg/L)

Well	RCRA Total Metals with Mercury (unfiltered)	RCRA Dissolved Metals with Mercury (filtered)
RU-03	arsenic 4.2 barium 155 chromium 9.3 lead 5.3	barium 70.2
RU-06A	barium 113 chromium 4.3 lead 2.9	barium 108
RU-06A Duplicate	barium 116 chromium 1.2	barium 109
RU-08	barium 116 chromium 1.3	barium 105

*Constituents that were not detected were not listed.

Table 3-4
Comparison of TDS, TSS, and Lead Values from RU-06A and Duplicate, Fourth Quarter 1997

Analysis	RU-06A (RUW00122)	RU-06A - Duplicate (RUW00124)
Total Dissolved Solids	400 mg/L	395 mg/L
Total Suspended Solids	16 mg/L	12 mg/L
RCRA Total Lead	2.9 µg/L	2.0 U µg/L
RCRA Dissolved Lead	2.0 U µg/L	2.0 U µg/L

U - Analyte not detected above the specified value.

The risk-based trigger levels are as follows for the following metals: barium=5,000 μg/L, chromium III=71,000 μg/L, chromium VI=360 μg/L, and lead=1,000 μg/L (DOE/NV, 1996e). During quarterly groundwater sampling, the maximum value of barium detected was 425 μg/L, the maximum value of total chromium detected was 39.2 μg/L, and the maximum value of lead was 18.5 μg/L.

4.0 Waste Disposition

This section details the waste management and disposal activities for the contaminated pond sediment.

4.1 Waste Management Activities

Stabilization and removal of the contaminated pond sediment began once the pond was drained. Kiln dust was used to stabilize the sediments since tests showed that kiln dust was as effective as cement in stabilizing the sediments and was considerably less costly. Since the kiln dust was effective in absorbing free liquid, the sediment was not dried or dewatered as specified in the Rulison CAP (DOE/NV, 1996a). Also described in the Rulison CAP was the use of a pug mill to mix the stabilizer and the sediment. A pug mill was not used since it was determined that mixing the stabilizer with the sediment in the pond was more efficient and cost-effective (DOE/NV, 1996e).

The kiln dust was thoroughly mixed into the soil at a ratio of approximately 1:9. After mixing, the stabilized sediment was left in the pond to set up for one or two days before being transferred to a stockpile located east of the pond. Then the stabilized sediment in the stockpile was sampled and stored pending the return of analytical results. The samples were analyzed for TPH, TCLP chromium, and TCLP benzene. Some initial stabilized sediment samples were also analyzed for radionuclides. Results showed that there were no unusual levels of radionuclides detected, therefore the radionuclide analysis was discontinued. When the analytical results were received, the stabilized sediment was loaded into dump trucks then transported to the South Canyon Landfill in Garfield County, Colorado, for disposal. A sample of the stabilized sediment was collected as each dump truck was being loaded. Each sample was tested for pH and analyzed for free liquids using the paint filter test. This ensured that the load met landfill acceptance criteria before the truck was released from the site. All TPH, TCLP chromium, TCLP benzene, paint filter, and pH results met landfill disposal criteria (DOE/NV, 1996e).

4.2 Waste Disposal

A total of 1,923 m^3 (2,384 yd^3) of kiln dust was used to stabilize the sediment, and 18,656 m^3 (24,400 yd^3) of stabilized sediment and soil were hauled to the South Canyon Landfill. This volume significantly exceeded the estimated volume in the Rulison VSAP (DOE/NV, 1996d), as the depth of contamination exceeding cleanup criteria was greater than expected.

During the quarterly groundwater monitoring sampling events, only sanitary waste was generated. The purge water from the first quarter 1996 through the third quarter 1997 was discharged to the ground under Colorado Wastewater Discharge Permit Number COG-310084 as approved by the CDPHE Water Quality Control Division. Though this permit was originally intended for, and guided, the discharge of water from the Rulison Pond during remediation activities in 1996. This permit was canceled verbally on October 28, 1997, as it was not required for these wells since the volume of purged water was not sufficient to reach a viable water source. Water purged from the fourth quarter 1997 sampling event was discharged to the ground, but not under the National Pollutant Discharge Elimination System (NPDES) permit. A copy of the discharge permit and letter terminating the discharge permit are included in Appendix A.

5.0 Conclusions and Recommendations

Conclusions and recommendations for the closure of the Rulison Site Surface are presented in the following subsections.

5.1 Conclusions

The closure of the Rulison Drilling Effluent Pond was completed in accordance with the approved *Corrective Action Plan, Rulison Drilling Effluent Pond*, July 1996 (DOE/NV, 1996a); *Verification Sampling and Analysis Plan for Sediment and Water Sampling, Rulison Drilling Effluent Pond*, July 1996 (DOE/NV, 1996d); *Rulison Site Quality Assurance Project Plan, Rulison Site, Colorado*, July 1996 (DOE/NV, 1996c); and *Rulison Drilling Effluent Pond Site Long-Term Groundwater Monitoring Plan*, July 1996 (DOE/NV, 1996b). The pond was drained and hydrocarbon-impacted materials exceeding the 1,000 mg/kg TPH limit were stabilized and removed from the Drilling Effluent Pond. Approximately 520 m^3 (620 yd^3) of TPH-contaminated soil between 250 mg/kg and 1,000 mg/kg remain in the soils under the pond. Following verification that all soils remaining in the bottom and sides of the pond met the soil quality criteria specified for the site, the pond was restored in general accordance with Section 3.8 of the Rulison CAP (DOE/NV, 1996a). Section 3.3 of the Rulison CAR (DOE/NV, 1996e) contains details of the pond restoration.

The landowner was granted temporary use of the spring to refill the pond, and as of February 1996 the pond was filled. The pond was scheduled to be restocked with trout in the summer of 1997. However, a study conducted in September 1996 to evaluate the quality of the water in the pond found that the dissolved oxygen levels would not support a trout population. With the exception of low dissolved oxygen levels, the water quality is adequate for trout survival. Dissolved oxygen levels are likely to increase in two to three years when the sod covering the clay liner has completed decomposing (IT, 1997).

Results from the two-year groundwater quality monitoring program show that groundwater flow is consistently to the northwest and that the migration of contaminants from the drilling effluent pond sediments is not occurring. There were no accedences of risk-based trigger levels. Total petroleum hydrocarbons was not detected during the two-year groundwater monitoring program and only anomalous detections of benzene and toluene were detected in upgradient Well RU-03. Barium appears to be naturally occurring and is in the groundwater in a dissolved state and as a suspended solid. Chromium, lead, and selenium, when detected, are most likely related to suspended solids that naturally occur in the soil.

Sampling information was provided in detail in the *Rulison Site Corrective Action Report* (DOE/NV, 1996e) to substantiate the petition for closure in-place of the mud pits located at the R-EX area. A risk assessment determined that the subsurface contamination found in the R-EX mud pit subsurface soils does not pose an undue risk to human health. Sampling information also indicates that migration through the groundwater is not occurring to the downgradient wells RU-01 or RU-02, nor is migration to the adjacent unnamed “Hayward” creek occurring (DOE/NV, 1996e).

5.2 Recommendations

The U.S. Department of Energy, Nevada Operations Office (DOE/NV) recommends that since the closure activities were completed as proposed, and groundwater monitoring detected no trends that indicated an increase in levels of the constituents of concern, the CDPHE provide the DOE/NV a Notice of Completion for the approval of closure of the Rulison Site Surface Area, and that no further action is required. The area includes the former Rulison Drilling Effluent Pond, the SGZ area, the gas flare area, and the mud pits adjacent to Well R-EX.

6.0 References

AEC, see U.S. Atomic Energy Commission.

DOE/NV, see U.S. Department of Energy, Nevada Operations Office.

DRI, see Desert Research Institute.

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U.S. Energy Research and Development Administration. 1977. *Project Rulison Well Plugging and Site Abandonment Final Report*, NVO-187. Las Vegas, NV.

Appendix A

Letters Regarding Colorado Wastewater Discharge Permit Number COG-310084

A-1 Certification, Colorado Wastewater Discharge Permit. June 30, 1995.

A-2 Amended Certification, Colorado Wastewater Discharge Permit. August 14, 1995.

A-3 Request for Termination of Permit to Discharge. March 21, 1997.

A-4 Termination of Permit to Discharge. November 18, 1997.

A-1 Certification, Colorado Wastewater Discharge Permit. June 30, 1995.

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STATE OF COLORADO

Roy Romer, Governor
Patti Shwayder, Acting Executive Director

Dedicated to protecting and improving the health and environment of the people of Colorado

4300 Cherry Creek Dr. S.
Denver, Colorado 80222-1530
Phone (303) 692-2000

Laboratory Building
4210 E. 11th Avenue
Denver, Colorado 80220-3716
(303) 691-4700

Colorado Department of Public Health and Environment

June 30, 1995

U. S. Department of Energy
Roxanne Danz
P.O. Box 98518
Las Vegas, Nevada 89193-8518

CERTIFIED MAIL NO: Z 416 968 756

RE: Certification, Colorado Wastewater Discharge Permit System:
Permit Number: COG-310084, U.S. Department of Energy

Dear Ms. Danz:

Enclosed please find a copy of your certification which was issued under the Colorado Water Quality Control Act. This permit requires that specific actions be performed at designated times. You are legally obligated to comply with all terms and conditions of the permit and certifications. It is especially important to note the effective date which can be found on page one of the Certification. It is illegal to discharge per the conditions of this permit until that date.

Please read the permit and if you have any questions contact this office at 692-3590.

Sincerely,

Robert J. Shukle

Robert J. Shukle, Chief
Permits and Enforcement Section
Water Quality Control Division

xc: Permits Section, Environmental Protection Agency
Regional Council of Government
Local County Health Department
District Engineer, Field Support Section, WQCD
Derald Lang, Field Support Section, WQCD
Permit Drafter, Permits and Enforcement Section, WQCD

Enclosure
RJS: mlb

ACTION	
INFO	ERD
MGR	
AMA	
AMESSH	
AMO	
AMEM	
OCFO	

COLORADO DISCHARGE PERMIT SYSTEM
CERTIFICATION
GROUNDWATER CLEANUP OF GASOLINE

Category 07, Sub-category 8, General Permits, Gasoline cleanup Current fee $850/year per CRS 25-8-502
SIC code 1629

This permit specifically authorizes, *U.S. Department of Energy*
Roxanne Danz
P.O. Box 98518
Las Vegas, Nevada 89193-8518
(702)+295-1113

with the facility contact of, *Same as above*

to discharge from facility identified as ***Drilling Effluent Pond*** *project, located in the SW 1/4, Section 25, T7S, R95W; Garfield County as shown in Figure 1 of the permit from discharge points identified as 001-002, as shown in Figure 2 of the Permit and further described in this table,*

Discharge Point	*Description*	*Estimated Flow Rate*
001	*Discharge from the drilling effluent pond following treatment prior to entering Hayward Creek.*	*Avg. = 25 gpm* *Max. = 500 gpm*
002	*Discharge from the wellpoints following treatment prior to entering Hayward Creek.*	*Max. = 150 gpm* *Avg. = 75 gpm*

The discharge goes to Hayward Creek, which is within Segment 7, Lower Colorado River Sub-basin, Lower Colorado River Basin, found in 3.7.0 Classifications and Numeric Standards for the Lower Colorado River Basin (5 CCR 1002-8). Segment 7 is classified for the following uses: Recreation, Class 2; Aquatic Life, Class 1 (cold); Agriculture; Water Supply. The Division reviewed this facility on 6/12/95 and determined that the antidegradation presumption was overcome because the discharge is temporary (1 week).

The activity involves cleanup of sediment contaminated with petroleum hydrocarbons and metals. Surface water showed very low or non-detectable levels of petroleum hydrocarbons and toxic metals. Discharge will be treated by on-site activated carbon filters.

The flow limitation of 0.05 MGD will be waived due to the short duration of this discharge.

Table V-1 - Effluent Limits for Discharge Point 001.

Parameter	Limitation		Rationale
Flow, MGD	Report	d/	
TSS, mg/ℓ	30/45	a/	State Effluent Regulations
pH, s.u.	6.5-9.0	b/	Water Quality Standards
Oil and Grease, mg/ℓ	10	c/	State Effluent Regulations
Potentially Dissolved Lead, mg/ℓ *	0.031	c/	Water Quality Standards
Benzene, mg/ℓ	0.001	d/	Best Professional Judgment
BETX, mg/ℓ	0.1	c/	Basic Water Quality Standards
Total Dissolved Solids, mg/l **	Report		Colorado River Basin Salinity Standards
Total Phosphorus, mg/l ***	Report		Control Regulations For Basins Listed In I.C.4.b

a/ 30-Day Average/7-Day Average c/ Daily Maximum
b/ Minimum-Maximum d/ 30-Day Average

* See Permit Rationale discussion, page 6
** Applicable to waters of the Colorado River basin only. See I.D.8. of the Permit
*** Applicable to waters listed in I.C.4.b) of the Permit

Additional Monitoring: The Division reserves the right to request further monitoring of any pollutants outside the requirements of this permit to insure that the conditions of the general permit are met and/or to ensure that the antidegradation presumption is overcome by site specific reasons specified in Section 3.1.8(1)(c)(i)(ii)(iii) of The Basic Standards and Methodologies for Surface Water. If any of the additional monitoring indicates pollutants of concern that may be of an impact to the receiving waters, or may need limitations set, then the Division shall determine that an individual permit is required and reserves the right to require that the discharges cease until an individual permit is in effect. Additional monitoring shall be included with the Discharge Monitoring Report (DMR) and shall be subject to the permit's monitoring and reporting requirements.

Additional monitoring for discharge point 001-002.

Parameter	Trigger Level	Frequency	Rationale
Total Mercury, ug/l	0.01	Once at beginning of draining pond, once halfway through, and once near end of pond draining.	Metals concentration in the sediments of the pond. Concern that metal concentrations in surface water will rise as sediments are disturbed.
Total Recoverable Iron, ug/l	1000		
Total Recoverable Zinc, ug/l	2		
Total Recoverable Chromium, ug/l	50		

Results for additional monitoring parameters must be obtained as soon as possible after sampling. If trigger levels are reached or exceeded, permittee shall cease discharge and notify the Division immediately.

The permittee is encouraged to read the general rationale for an understanding of how this permit was developed and to read the permit to see what requirements exist. Within the body of the permit itself, effluent limitations and monitoring requirements are specified in Parts I.B and I.C, Best Management Practices are addressed in Part I.F.5., and special notification requirements for effluent violations are addressed in Part II.A.2. and II.A.3. ***Organic Toxic Pollutants in the volatile fraction (VOC) shall be monitored and the data submitted in the manner described in I.C.4. of the permit. The first instance of VOC monitoring for this facility shall be within 90 days of the effective date of this certification.***

Salinity (TDS) monitoring of the discharge will be required.
Total Phosphorus monitoring of the discharge will not be required.

Aquatic life Whole Effluent Toxicity (WET) testing will not be required, *because of the short duration of the discharge.*

Although there is fuel storage in the project area, a Materials Containment Plan will not be required. However, diking should be performed as discussed in Best Management Practices Part I.F.5. of the permit.

Certification: Based on the above information, the gasoline cleanup facility is certified to discharge under the general permit for groundwater cleanup of gasoline, identified as permit number COG-310000. ***All correspondence relative to this facility should reference the specific facility number, COG-310084.***

Tom Boyce
June 12, 1995

Effective 06/30/95 . *Certified Letter No.* Z 416 968 756 .

CDPS GENERAL PERMIT

GROUNDWATER CLEANUP OF GASOLINE

AUTHORIZATION TO DISCHARGE UNDER THE

COLORADO DISCHARGE PERMIT SYSTEM

In compliance with the provisions of the Colorado Water Quality Control Act, (25-8-101 et seq., CRS, 1973 as amended) and the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et seq.; the "Act") facilities performing groundwater cleanup from gasoline contamination are authorized to discharge cleanup water from approved locations throughout the State of Colorado to specified waters of the State. Such discharges shall be in accordance with the conditions of this permit.

This permit specifically authorizes the facility listed on page 1 of this permit to discharge process generated wastewaters, as of this date, in accordance with the permit requirements and conditions set forth in Parts I and II hereof. All discharges authorized herein shall be consistent with the terms and conditions of this permit.

This permit and the authorization to discharge shall expire at midnight,

March 31, 2000.

Issued and Signed this 13 day of January Effective April 1, 1995

COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT

Robt J Shukle for

J. David Holm, Director
Water Quality Control Division

CERTIFIED LETTER NO.
DATE SIGNED 01/13/95
EFFECTIVE DATE OF
PERMIT 04/01/95

RENEWAL OF

CDPS GENERAL PERMIT RATIONALE

GROUNDWATER CLEANUP OF GASOLINE

AUTHORIZATION TO DISCHARGE UNDER THE

COLORADO DISCHARGE PERMIT SYSTEM

Update

The most significant changes in this renewal are as follows:

A. *Total phosphorus monitoring is required for certain Waters of the State. Nutrient loading can lead to algal blooms, which can cause low oxygen situations that degrade the aquatic life habitat and affect the quality of the water for water supply and recreational purposes. The Water Quality Control Division has established control regulations for these waterbodies and requires monitoring of discharges for these nutrients. The permit is being modified to include monitoring for Total Phosphorus where required. Paragraph (I.C.4.b.) lists these waters and describes sampling frequency and type.*

B. *New language has been added to the WET testing section to allow flexibility to the permit in dealing with toxicity. These changes bring this permit into agreement with the "Colorado WQCD Biomonitoring Guidance Document July 1, 1993" and are as follows:*

   1 *Language allowing greater flexibility in the determination of frequency or applicability of WET testing for certain facilities has been added. These decisions will be made on the basis of analytical data, duration of discharge, flow rates or other factors that the Division deems relevant. WET testing requirements and limits are included in Part I.B.2.c) of the permit.*

   2 *The imposition of an acute toxicity limit is included. This defines the conditions that must be met in order to comply with the WET limit.*

   3 *In cases that the Division determines that WET testing is required, Acute tests rather than Chronic tests will be required due to the low flow rates normally associated with this type of discharge.*

   4 *Language describing the Accelerated testing, Preliminary Toxicity Incident, and Toxicity Identification Evaluation procedures are included in the permit for cases where permittees have failed the WET tests.*

C. *Review of the EPA RREL 4 data and data from permitted gasoline remediation sites collected over the past five years in Colorado, demonstrates that a limit of 1 ug/l for benzene can and has been achieved by treating benzene contaminated ground water with air stripping and/or granular activated carbon (GAC) systems.*

C. cont.

When air stripping plus GAC is used as treatment for ground water containing a benzene concentration between 0 and 100 ug/l, the reported treated effluent benzene concentration is less than 1.0 ug/l. Typical removal efficiencies appear to be in excess of 90% and frequently are in excess of 99%, when influent concentrations of benzene 100 ug/l.

Over 90% (11 out of 12) of the facilities that submitted data for benzene in Colorado for the past two years demonstrated that they could routinely meet a 1 ug/l benzene limit.

D. *Comments during public notice*

No written comments were received during the public notice period. No changes were made to the permit or rationale from the public notice permit.

References

I. *U.S. Environmental Protection Agency. RREL 4 Treatability Database. Cincinnati, Ohio.*

II. *State of California Regional Water Quality Control Board, Central Valley Region. A Compilation of Water Quality Goals. Sacramento, California.*

Reauthorization

Authorization to discharge under this general permit will expire on March 31, 2000; thus facilities wishing continual coverage under this permit must reapply by September 30, 1999.

Tom Boyce
December 14, 1994

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PART I

PART II

PART I

A. COVERAGE UNDER THIS PERMIT

1. Types of Wastewater

Under this general permit, facilities engaged in cleanup of gasoline from contaminated groundwater may be granted authorization to discharge treated process generated wastewaters into waters of the state of Colorado. For purposes of this permit, process generated wastewaters include:

Wastewater produced from cleanup of groundwater contaminated by gasoline and aviation gasoline. Cleanup of other petroleum products, such as aviation turbine fuel, kerosene, and diesel fuel, may not be covered under this permit.

2. Stream Dredging or Filling

This permit does not constitute authorization under 33 U.S.C. 1344 (Section 404 of the Clean Water Act) of any stream dredging or filling operations.

3. Criteria

The following is a list of the criteria which will be used in evaluating whether or not an individual permit may be required instead of a general permit:

a) proximity of the operation to a landfill or mine and mill tailings;

b) evidence of significant noncompliance under a previous permit for the operation;

c) an effluent flow greater than 0.05 MGD (50,000 gpd), except for flow exemption under Part I.A.4;

d) presence of downstream drinking water intakes or a fishery;

e) the need to preserve high quality water;

f) addition of flocculants (settling agents or chemical additives) to water prior to discharge;

g) use of chemicals (such as chlorine) within the system;

h) failure of the effluent to pass a Whole Effluent Toxicity (WET) test;

i) lead or organics levels in the effluent which could lead to a violation of the receiving waters instream water quality standard for lead or organics, respectively;

j) an anti-degradation review by the Division showing that the discharge would cause unallowable degradation to the receiving waters.

A. COVERAGE UNDER THIS PERMIT

4. Flow Volume Exemption

The Flow Volume Exemption may be applied under two separate circumstances, as follows:

a) The flow volume limit of 0.05 MGD may be temporarily waived for 30 days, for temporary dewatering sites. This provision will be approved by the Division on a case by case basis. The temporary dewatering projects which use the Flow Volume Exemption have the option of remaining under the general permit beyond the initial period, provided that the 0.05 MGD flow limit is met after the initial 30 days.

b) The flow volume limit of 0.05 MGD may be temporarily deleted for groundwater remediation sites with a discharge of greater than 0.05 MGD, if approved by the Division, provided that the permittee has applied for an individual discharge permit for the site. During this interim period, the Division reserves the right to impose additional monitoring and/or other requirements in order to verify compliance with the general permit. These requirements will be covered outside of the permit by letter. Noncompliance with the additional requirements could result in revocation of the permittee's certification under the general permit.

Any request for a Flow Volume Exemption must be included with the permittee's permit application. See the individual Certification Rationale to determine whether or not the exemption is allowed. In any event, no temporary flow increase is allowed without prior Division approval.

The Division reserves the right to refuse a facility coverage under the exemption. The flow volume, level of organics in the effluent, quality of receiving waters, and/or lack of information on the treatment system capability will be evaluated. The Division will use best professional judgment in determining whether or not the exemption will provide adequate coverage for the discharge.

5. Application

In order to be considered eligible for authorization to discharge under the terms and conditions of this permit, the owner, operator, and/or authorized agent of any facility desiring to discharge must submit, by certified mail or hand delivery, three copies of a completed discharge application form (available from the Division). The form requires, at a minimum, the following information:

a) Name, address, and descriptive location of the facility;

b) Name of principal in charge of operation of the facility;

c) Name of potential receiving waters;

d) Description of the type of activity resulting in the discharge, including the anticipated duration of activity and/or the discharge, anticipated volume and rate of discharge, and the source of water which is to be discharged;

e) Description of any wastewater treatment system and recycle/reuse utilized;

A. COVERAGE UNDER THIS PERMIT

5. Application cont.

f) A topographic map showing the general geographical location of the facility and any nearby landfills or mine or mill tailings;

g) A sketch of the facility showing all structures, outfalls and receiving waters, as well as storage locations of any petroleum or chemicals on site; and

h) A chemical analysis of the water to be discharged.

i) If the discharge is to a storm sewer system, ditch, or other man made conveyance, approval from the owner of the system must be obtained prior to certification under this permit. Documentation of this approval must be submitted with the discharge application.

At least thirty days prior to the anticipated date of discharge, three copies of the application shall be submitted to:

Colorado Department of Public Health and Environment
WQCD-PE-B2
4300 Cherry Creek Drive South
Denver, Colorado 80222-1530

The Division shall have up to thirty days after receipt of the above information to request additional data and/or deny the authorization for any particular discharge. Upon receipt of additional information, the Division shall have an additional thirty days to issue or deny authorization for the particular discharge.

If the applicant does not receive a request for additional information or a notification of denial from the Division within 30 days, authorization to discharge in accordance with the conditions of the permit shall be deemed granted.

If the Division determines that the operation does not fall under the authority of the general permit, then the information received will be treated as an individual permit. In this case, discharge is not allowed until a permit is issued, which may take 180 days.

6. Expiration

Authorization to discharge under this general permit shall expire on March 31, 2000. The Division must evaluate and may reissue this general permit once every five years, and must also recertify the applicant's authority to discharge under the general permit at such time. Therefore, a permittee desiring continued coverage under the general permit must reapply by September 30, 1999. The Division will determine if the applicant may continue to operate under the terms of the general permit. An individual permit will be required for any facility not reauthorized to discharge under the reissued general permit. For facilities wishing to terminate authorization under the new permit, provisions of Part II.B.5.d will be applicable.

B. TERMS AND CONDITIONS

1. General Limitations

a) Discharge is allowed of treated process-generated wastewater from the cleanup of gasoline from contaminated groundwater. There shall be no discharge of groundwater from the cleanup of any other petroleum products, such as aviation turbine fuel, kerosene, or diesel fuel without prior approval.

b) There shall be no discharge of sanitary wastewater from toilets or related facilities into the treatment facilities covered under this permit.

c) There shall be no discharge of floating solids or visible foam in other than trace amounts.

d) No chemicals are to be added to the discharge unless permission for the use of a specific chemical is granted by the Division. In granting the use of such chemicals, additional limitations and monitoring requirements may be imposed.

e) Bulk storage structures for gasoline and other chemicals shall have adequate protection so as to contain all spills and prevent any spilled material from entering the effluent stream or waters of the State.

2. Effluent Limitations

In accordance with the Regulations for Water Quality Control Commission for Effluent Limitations, Section 10.1.3, and Regulations for the State Discharge Permit System, Section 6.9.2, 5 C.C.R. 1002-2, the permitted discharge shall not contain effluent parameter concentrations which exceed the following limitations or exceed the specified flow limitation:

Effluent Parameter	Discharge Limitations		
	30-Day Avg	7-Day Avg	Daily Max
Flow, MGD	See B.2.a)	NA	Report
Total Suspended Solids, mg/l	30	45	NA
Potentially Dissolved Lead, mg/l *	NA	NA	0.031
Benzene, mg/l	0.001	NA	NA
Total BETX, mg/l **	NA	NA	0.1
Total Dissolved Solids, mg/l ***	NA	NA	Report
Whole Effluent Toxicity, Acute	NA	NA	See B.2.c)
Total Phosphorus, mg/l ****	NA	NA	Report

* The lead limit is applicable only to those facilities which discharge to streams which have an instream lead limit, or which could impact such a stream. See the individual Certification Rationale to determine if the limit is applicable.

** Total BTEX includes Benzene, Ethylbenzene, Toluene, and Total Xylenes.

*** Applicable to waters of the Colorado River basin only. See I.D.8.

**** Applicable to waters listed in I.C.4.b)

pH - standard units shall remain between 6.5 and 9.0.
Oil and Grease shall not exceed 10 mg/l.

B. TERMS AND CONDITIONS

2. Effluent Limitations (Cont.)

a) The flow limit used will be the 30 day average flow (design) from the facility. See the individual Certification Rationale for the flow limit applicable to the individual facility.

b) **Benzene** Best Professional Judgment is the basis for the benzene limitation in this permit. The Division has established the permit limit for benzene as 0.001 mg/, because this effluent concentration has been proven achievable using present technology, i.e. air stripping and/or granular activated carbon systems.

c) **WET Testing:** The Division will examine each discharge application on a case by case basis. In cases where the data and circumstances justify, the Division may determine that WET testing not be required under the general permit for certain facilities. Similarly, the Division may determine that the frequency of WET testing be either increased or decreased from the normal quarterly monitoring depending on the analytical data, duration of discharge, flow rates or other factors that the Division deems relative. Unless specifically exempted in the rationale, the following the following WET testing requirements shall be preformed.

As a condition of the permit, the permittee will be required to conduct routine monitoring for acute toxicity using Ceriodaphnia sp. (water flea) and fathead minnows. An acute WET test is failed whenever the LC_{50}, which represents an estimate of the effluent concentration which is lethal to 50% of the test organisms in the time period prescribed, is found to be less than or equal to 100% effluent.

The monitoring frequency for acute WET tests shall be quarterly, commencing with the first full calendar quarter following the permit effective date. Quarterly test results shall be reported on a Quarterly DMR along with the Discharge Monitoring Reports (DMRs) submitted for the end of the reporting calendar quarter (i.e., WET testing results for the calendar quarter ending March 31 shall be reported with the DMR due April 28, with the remaining WET testing reports submitted with DMRs due each July 28, October 28 and January 28).

In addition to the WET test reporting DMR, the permittee shall submit CDPS WET Test Report Forms (generally completed by the laboratory for each species). Copies of these reports are to be submitted to both the Division and EPA.

The permittee shall conduct each acute WET test in general accordance with methods described in Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms,EPA/600/4-90/027 or the most current edition, except as modified by the most current Division guidance document entitled Guidelines for Conducting Whole Effluent Toxicity Tests. The permittee shall conduct an acute 48-hour WET test using Ceriodaphnia sp., and an acute 96-hour WET test using fathead minnows. Acute tests will be replacement static tests of a single grab sample.

Should acute toxicity be detected, the permittee must provide written notification of the failure of a WET test to the Division, along with a statement as to whether the Preliminary Toxicity Incident ("PTI")/Toxicity Identification Evaluation ("TIE") investigation or accelerated testing is being performed . Notification must be received by the Division within 14 calendar days of the demonstration of acute WET in the routine required test. "Demonstration" means no later than the last day of the laboratory test.

B. TERMS AND CONDITIONS

2. Effluent Limitations

c) **WET Testing** cont.

If a routine acute WET test is failed, the permittee shall either:

(i) proceed to conduct the PTI/TIE investigation as described below or

(ii) conduct accelerated testing using the single species found to be more sensitive.

If accelerated testing is being performed, the permittee shall provide written notification of the results within 14 calendar days of completion of the "Pattern of Toxicity"/"No Toxicity" demonstration. Testing will be at least once every two weeks for up to five tests until 1) two consecutive tests fail or three of five tests fail, in which case a pattern of toxicity has been demonstrated or, 2) two consecutive tests pass or three of five tests pass, in which case no pattern of toxicity has been found. If no pattern of toxicity is found, the toxicity episode is considered to be ended and routine testing is to resume. If a pattern of toxicity is found, a PTI/TIE investigation is to be performed. If a pattern of toxicity is not demonstrated but a significant level of erratic toxicity is found, the Division may require an increased frequency of routine monitoring or some other modified approach.

The results of the PTI/TIE investigation are to be received by the Division within 120 days of the demonstration of acute WET in the routine test, as defined above, or if accelerated testing is performed, the date the pattern of toxicity is demonstrated. A status report is to be provided to the Division at the 30, 60 and 90 day points of the PTI/TIE investigation. The Division may extend the time frame for investigation where reasonable justification exists. A request for an extension must be made in writing and received prior to the 120 day deadline. Such request must include a justification and supporting data for such an extension.

The permittee may use the time for investigation to conduct a PTI or move directly into the TIE. A PTI consists of a brief search for possible sources of WET, which might reveal causes of such toxicity and appropriate corrective actions more simply and cost effectively than a formal TIE. If the PTI allows resolution of the WET incident, the TIE need not necessarily be conducted. If, however, WET is not identified or resolved during the PTI, the TIE must be conducted within the 120 days.

Any permittee that is required to conduct a PTI/TIE investigation shall do so in conformance with procedures identified in the following documents, or as subsequently updated: 1) Methods for Aquatic Toxicity Identification Evaluations, Phase I Toxicity Characterization Procedures, EPA/600/6-91/003 Feb. 1991 and 2) Methods for Aquatic Toxicity Identification Evaluations, Phase II Toxicity Identification Procedures, EPA/600/3-88/035 Feb. 1989. A third document in this series is Methods for Aquatic Toxicity Identification Evaluations, Phase III Toxicity Confirmation Procedures, EPA/600/3-88/036 Feb. 1989. As indicated by the title, this procedure is intended to confirm that the suspected toxicant is truly the toxicant. The Phase III investigation is optional.

B. TERMS AND CONDITIONS

2. Effluent Limitations

c) **WET Testing** cont.
If toxicity spontaneously disappears at any time after a test failure, the permittee shall notify the Division in writing within 14 days of a demonstration of disappearance of the toxicity. If a pattern of toxicity or recurring toxicity is not identified, the toxicity incident response is considered closed and normal WET testing shall resume.

C. MONITORING REQUIREMENTS

1. Frequency and Sample Type

In order to obtain an indication of the probable compliance or noncompliance with the effluent limitations specified in Section B, the permittee shall monitor all effluent parameters at the following frequencies.

Effluent Parameter	Measurement Frequency	Sample Type
Flow, MGD	Weekly	Instantaneous or Continuous
Total Suspended Solids, mg/l	Monthly	Grab
pH, s.u.	Weekly	Grab
Oil and Grease, mg/l	Weekly	Visual See I.D.12.
Potentially Dissolved Lead, mg/l	Monthly	Grab
Benzene, mg/l	Monthly	Grab
Total BETX, mg/l	Monthly	Grab
Whole Effluent Toxicity, Acute (See Part I.B.2.c)	Quarterly ***	Grab
Total Dissolved Solids, mg/l *	Quarterly	Grab
Total Phosphorus, mg/l **	Monthly	Grab

* Applicable to waters of the Colorado River basin only. See I.D.8.
** Applicable to waters listed in I.C.4.b)
*** Quarterly monitoring unless modified by the Division.

If the permittee, using the approved analytical methods, monitors any parameter more frequently than required by this permit, then the results of such monitoring shall be included in the calculation and reporting of the values required in the Discharge Monitoring Report Form or other forms as required by the Division. Such increased frequency shall also be indicated.

C. MONITORING REQUIREMENTS cont.

2. Detection Limits

When the most sensitive analytical method which complies with Part I.F.2. of the permit has a detection limit greater than or equal to the permit limit, the permittee shall report "less than the detectable limit," as appropriate. Such reports shall not be considered as violations of the permit limit.

3. Reporting of Data

Reporting of the data gathered in compliance with Part I.C.1 shall be on a quarterly basis. Monitoring results shall be summarized for each month and reported on Division approved discharge monitoring report forms received by the Division no later than the 28th day of the last month of the quarter. If no discharge occurs during the reporting period, "No Discharge" shall be reported.

Duplicate signed copies of the above report forms shall be submitted to the following addresses:

Submit the top copy (original) of each set of forms to:

Colorado Department of Public Health and Environment
WQCD-PE-B2
4300 Cherry Creek Drive South
Denver, Colorado 80222-1530

Submit the second duplicate of each set of forms to:

U.S. Environmental Protection Agency
Water Management Division
NPDES Branch 8WM-C
Denver Place
999 18th Street, Suite 500
Denver, CO 80202-2405

4. Special Monitoring

Pursuant to CRS 1973, 25-8-304, and to maintain a current data base for proper evaluation of the water quality impact of the discharge, the permittee shall monitor and submit data for Organic Toxic Pollutants in the volatile fraction listed in I.C.4.a) on an annual basis. The analysis shall be done from a grab sample by GC/MS and each parameter shall be reported individually. The first instance of monitoring shall be performed within three months of the certification effective date, and the results submitted to the Division with the next DMR.

If the new data indicate the presence of any organics at levels which might violate the organic pollutant standards contained in tables A, B or C of "The Basic Standards and Methodologies for Surface Water," 3.1.0, the Division reserves the right to require the facility to obtain an individual permit.

C. MONITORING REQUIREMENTS

4. Special Monitoring (Cont.)

a) Organic Toxic Pollutants - Volatiles Fraction
(all units are ug/l)

Parameter	Maximum Acceptable Detection Level	Parameter	Maximum Acceptable Detection Level
Acrolein	25	1,2-Dichloropropane	5
Acrylonitrile	25	1,3-Dichloropropylene	5
Benzene	5	Ethylbenzene	5
Bromoform	5	Methyl Bromide	10
Carbon Tetrachloride	5	Methyl Chloride	10
Chlorobenzene	5	Methylene Chloride	10
Chlorodibromomethane	5	1,1,2,2-Tetrachloroethane	5
Chloroethane	10	Tetrachloroethylene	5
2-Chloroethylvinyl Ether	10	Toluene	5
Chloroform	5	1,2-Trans-dichloroethylene	5
Dichlorobromomethane	5	1,1,1-Trichloroethane	5
1,1-Dichloroethane	5	1,1,2-Trichloroethane	5
1,2-Dichloroethane	5	Trichloroethylene	5
1,1-Dichloroethylene	5	Vinyl Chloride	2

b) Total phosphorus (as P) monitoring is required for facilities which discharge into the following drainage basins: Cherry Creek basin, Chatfield Reservoir upstream of the USGS gage at Waterton and on Plum Creek, Dillon Reservoir basin (i.e. Ten Mile Creek, Snake River, Blue River, all tributaries to the Dillon Reservoir), and Bear Creek basin. The Division also reserves the right to include phosphorus monitoring for any receiving waters that may later enter into phosphorus monitoring requirements. If phosphorus monitoring is a requirement of the permit than it shall be included within the terms and conditions of the individual Certification Rationale of the permit. Additional monitoring for phosphorus shall be included on the (DMR) and shall be subject to the permit's monitoring and reporting requirements. Phosphorus sampling shall be on a quarterly basis, taken as a grab sample.

D. DEFINITIONS

1. "BETX" shall be measured as the sum of benzene, ethylbenzene, toluene and xylenes. EPA methods 502, 602, 624, 1624, 8020, 8240, or 8260 shall be used for the measurement of benzene, ethylbenzene, toluene, and xylenes including ortho-, meta-, and para-xylene.

2. A "composite" sample, for monitoring requirements, is a minimum of four (4) grab samples collected at equally spaced two (2) hour intervals and proportioned according to flow.

3. A "continuous" measurement, for flow monitoring requirements, is a measurement obtained from an automatic recording device which continually measures flow.

4. A "grab" sample, for monitoring requirements, is a single "dip and take" sample.

5. An "instantaneous" measurement, for monitoring requirements, is a single reading, observation, or measurement performed on site.

6. The "potentially dissolved metal" fraction is defined in "The Basic Standards and Methodologies for Surface Water," 3.1.0, as that portion of a constituent measured from the filtrate of a water and suspended sediment sample, that was first treated with nitric acid to a pH of 2 or less and let stand for 8 to 96 hours prior to sample filtration using a 0.4 or 0.45-um membrane filter. Note the "potentially dissolved" method cannot be used where nitric acid will interfere with the analytical procedure used for the constituent measured.

7. A "quarterly sample" shall be collected during March, June, September and December, if a continual discharge occurs. If the discharge is intermittent, then samples shall be collected during the period that discharge occurs.

8. "Salinity" is measured as Total Dissolved Solids (TDS). Where based on a minimum of 5 samples, the permittee demonstrates, to the satisfaction of the Water Quality Control Division, that the level of TDS in the effluent can be calculated based upon the level of electrical conductivity, the permittee may measure and report salinity in terms of electrical conductivity.

9. The "seven (7) day average" shall be determined by the arithmetic mean of all samples taken in a seven (7) day period. Samples may not be used for more than one (1) reporting period.

10. A "24 hour composite" sample is a combination of at least eight (8) sample aliquots of at least 100 milliliters, collected at equally spaced intervals during the operating hours of a facility over a twenty-four (24) hour period. For volatile pollutants, aliquots must be combined in the laboratory immediately before analysis. The composite must be flow proportional; either the time interval between each aliquot or the volume of each aliquot must be proportional to either the wastewater or effluent flow at the time of sampling or the total wastewater or effluent flow since the collection of the previous aliquot. Aliquots may be collected manually or automatically.

D. DEFINITIONS cont.

11. "The thirty (30) day average" shall be determined by the arithmetic mean of all samples collected during a thirty (30) consecutive-day period or calendar month.

12. A "visual" observation, for oil and grease monitoring requirements, is defined as observing the discharge to check for the presence of a visible sheen or floating oil. If either of these is present, a grab sample shall be taken, analyzed, and reported on the appropriate DMR. In addition, corrective action shall be taken immediately to mitigate the discharge of oil and grease. A description of the corrective action taken should be included with the DMR.

13. "Water Quality Control Division" or "Division" means the state Water Quality Control Division as established in 25-8-101 et al.)

E. REPORTING

1. Signatory Requirements

All reports and other information required by the Division shall be signed in ink and certified for accuracy by the permittee in accord with the following criteria:

a) In the case of corporations, by a principal executive officer of at least the level of vice-president or his or her duly authorized representative, if such representative is responsible for the overall operation of the facility from which the discharge described in the form originates;

b) In the case of a partnership, by a general partner;

c) In the case of a sole proprietorship, by the proprietor;

d) In the case of a municipal, state, or other public facility, by either a principal executive officer, ranking elected official, or other duly authorized employee.

e) The permittee shall make the following certification on all such documents;

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

F. GENERAL REQUIREMENTS

1. Representative Sampling

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge. All samples shall be taken at the monitoring points specified in this permit and, unless otherwise specified, before the effluent joins or is diluted by any other wastestream, body of water, or substance. Monitoring points shall not be changed without notification to and approval by the Division.

F. GENERAL REQUIREMENTS cont.

2. Analytical and Sampling Methods for Monitoring

Analytical and sampling methods utilized by the discharger shall conform to Colorado Regulations for Effluent Limitations (10.1.5), and to regulations published pursuant to Section 304 (h) of the Clean Water Act.

The analytical method selected for a parameter shall be the one that can measure the lowest detected limit for that parameter unless the permit limitation or stream standard for those parameters is within the testing range of another approved method.

3. Records

The permittee shall establish and maintain records. Those records shall include the following:

a) The date, type, exact location, and time of sampling or measurements;

b) The individual(s) who performed the sampling or measurements;

c) The date(s) the analyses were performed;

d) The individual(s) who performed the analyses;

e) The analytical techniques or methods used;

f) The results of such analyses; and

g) Any other observations which may result in an impact on the quality or quantity of the discharge as indicated in 40 CFR 122.44 (i)(1)(iii).

The permittee shall retain for a minimum of three (3) years records of all monitoring information, including all original strip chart recordings for continuous monitoring instrumentation, all calibration and maintenance records, copies of all reports required by this permit and records of all data used to complete the application for coverage under this permit. This period of retention shall be extended during the course of any unresolved litigation regarding the discharge of pollutants by the permittee or when requested by the Division or Regional Administrator of EPA.

4. Flow Measuring Device

If not already a part of the permitted facility, within ninety (90) days after the effective date of the certification, a flow measuring device shall be installed to give representative values of effluent quantities at the respective discharge points. A flow measuring device will be applicable at all designated discharge points. Pump capacity may be used for flow measurement if corrected for elevation head, pipe size and length, and pipe friction loss.

At the request of the Water Quality Control Division, or the Environmental Protection Agency, the permittee shall show proof of the accuracy of any flow measuring device used in obtaining data submitted in the monitoring report. The flow-measuring device must indicate values within ten (10) percent of the actual flow being discharged from the facility.

F. GENERAL REQUIREMENTS cont.

5. Best Management Practices

The permittee shall implement and maintain Best Management Practices for the control of surface runoff and prevention of erosion due to the discharge. Best Management Practices can include various options, such as: modification of the pipe discharge structure to disperse flows; containment of water by hay bales or other comparable structures; the use of geocloth, filter fabric, or plastic sheeting for protection of containment structures; rip-rap; and/or any other approved methods which might be used.

There shall be no sludge banks or deposition of solids downstream from the discharge(s). Control of excessive suspended solids shall be undertaken as necessary to prevent reaching surface receiving waters and causing any receiving water deterioration. Any hazardous materials or chemicals stored or used on site shall be adequately handled and contained to prevent any spills from occurring. Earthen dikes or concrete basins with capacity to hold contents of storage tanks or containers shall be used to prevent spills of these materials into State Waters in the event of failure of the storage containers.

PART II

A. MANAGEMENT REQUIREMENTS

1. Change in Discharge

The permittee shall inform the Division (Permits and Enforcement Section) in writing of any intent to construct, install, or alter any process, facility, or activity that is likely to result in a new or altered discharge, in and shall furnish the Division such plans and specifications which the Division deems reasonably necessary to evaluate the effect on the discharge and receiving stream.

The permittee shall submit this notice within two (2) weeks after making a determination to perform the type of activity referred to in the preceding paragraph. Process modifications include, but are not limited to, the introduction of any new pollutant not previously identified in the permit, or any other modifications which may result in a discharge of a quantity or quality different from that which was evaluated in the drafting of the permit including subsequent amendments. Following such notice, the permittee shall be required to submit a new CDPS application, and may be required to be covered under an individual permit to specify and limit any pollutants not previously limited, if the new or altered discharge might be inconsistent with the conditions of the general permit. In no case shall the permittee implement such change without first notifying the Division.

2. Special Notifications - Definitions

a) Bypass: The intentional diversion of waste streams from any portion of a treatment facility.

b) Severe Property Damage: Substantial physical damage to property at the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. It does not mean economic loss caused by delays in production.

c) Spill: An unintentional release of solid or liquid material which may cause pollution of state waters.

d) Upset: An exceptional incident in which there is unintentional and temporary noncompliance with permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or careless or improper operation.

3. Noncompliance Notification

a) If, for any reason, the permittee does not comply with or will be unable to comply with any discharge limitations or standards specified in this permit, the permittee shall, at a minimum, provide the Water Quality Control Division and EPA with the following information:

(i) A description of the discharge and cause of noncompliance;

A. MANAGEMENT REQUIREMENTS

3. Noncompliance Notification cont.

(ii) The period of noncompliance, including exact dates and times and/or the anticipated time when the discharge will return to compliance; and

(iii) Steps being taken to reduce, eliminate, and prevent recurrence of the noncomplying discharge.

b) The permittee shall report the following instances of noncompliance orally within twenty-four (24) hours from the time the permittee becomes aware of the noncompliance, and shall mail to the Division a written report containing the information requested in Part II.A.3.(a) within five (5) days after becoming aware of the noncompliance:

(i) Any instance of noncompliance which may endanger health or the environment;

(ii) Any unanticipated bypass which exceeds effluent limitations;

(iii) Any upset which causes an exceedance of any effluent limitation in the permit;

(iv) Any spill which causes any effluent limitation to be violated;

(v) Daily maximum violations for any toxic pollutants or hazardous substances limited by Part I-A of this permit and specified as requiring 24 hour notification. This includes any toxic pollutant or hazardous substance or any pollutant specifically identified as the method to control any toxic pollutant or hazardous substance.

c) The permittee shall report all other instances of non-compliance not requiring 24-hour notification at the time Discharge Monitoring Reports are submitted. The reports shall contain the information listed in sub-paragraph (a) of this section.

4. Submission of Incorrect or Incomplete Information

Where the permittee failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or report to the Division, the permittee shall promptly submit the relevant application information which was not submitted or any additional information needed to correct any erroneous information previously submitted.

5. Bypass

The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but if and only if it is for essential maintenance to assure optimal operation. These bypasses are not subject to the provisions noted in item b.) below. Division notification is not required.

Bypass is prohibited, and the Division may take enforcement action against a permittee for bypass, unless:

a) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

A. MANAGEMENT REQUIREMENTS

5. Bypass cont.

b) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if the permittee could have installed adequate backup equipment to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance;

c) The permittee submitted notices as required in "Bypass Notification", Part II.A.6.

6. Bypass Notification

If the permittee knows in advance of the need for a bypass, a notice shall be submitted, at least ten days before the date of the bypass, to the Division and the Environmental Protection Agency (EPA). The bypass shall be subject to Division approval and limitations imposed by the Division and EPA.

7. Upsets

a) Effect of an Upset

An upset constitutes an affirmative defense to an action brought for noncompliance with permit effluent limitations if the requirements of paragraph b of this section are met. (No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.)

b) Conditions Necessary for a Demonstration of Upset

A permittee who wishes to establish the affirmative defense of upset shall demonstrate through properly signed contemporaneous operating logs, or other relevant evidence that:

(i) An upset occurred and that the permittee can identify the specific cause(s) of the upset; and

(ii) The permitted facility was at the time being properly operated and maintained; and

(iii) The permittee submitted notice of the upset as required in Part II.A.3. of this permit (24-hour notice); and

(iv) The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

(v) In addition to the demonstration required above, a permittee who wishes to establish the affirmative defence of upset for a violation of effluent limitations based on water quality standards shall also demonstrate through monitoring, modeling, or other methods that the relevant standards were achieved in the receiving water.

A. MANAGEMENT REQUIREMENTS

7. Upsets cont.

c) Burden of Proof

In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.

8. Removed Substances

Solids, sludges, or other pollutants removed in the course of treatment or control of wastewaters shall be properly disposed of in a manner such as to prevent any pollutant from such materials from entering waters of the State.

9. Minimization of Adverse Impact

The permittee shall take all reasonable steps to minimize or prevent any adverse impact to waters of the State resulting from any discharge. As necessary, accelerated or additional monitoring to determine the nature and impact of the noncomplying discharge is required.

10. Discharge Point

Any discharge to the waters of the State from a point source other than specifically authorized by this permit is prohibited.

11. Reduction, Loss, or Failure of Treatment Facility

The permittee has the duty to halt or reduce any activity if necessary to maintain compliance with the effluent limitations of the permit. Upon reduction, loss, or failure of the treatment facility, the permittee shall, to the extent necessary to maintain compliance with its permit, control production, or all discharges, or both until the facility is restored or an alternative method of treatment is provided. This provision for example, applies to power failures, unless an alternative power source sufficient to operate the wastewater control facilities is provided.

It shall not be a defense for a permittee in an enforcement action that it would be necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

12. Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee as necessary to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems which are installed by the permittee only when necessary to achieve compliance with the conditions of the permit.

B. RESPONSIBILITIES

1. Inspections and Right to Entry

The permittee shall allow access to the Director of the Division, the EPA Regional Administrator, and/or their authorized representative, upon the presentation of credentials. In the making of such inspections, investigations, and determinations, the Division, in sofar as practicable, may designate as its authorized representatives any qualified personnel of the Department of Agriculture. The Division may also request assistance from any other state or local agency or institution.

a) To enter upon the permittee's premises where a regulated facility or activity is located or in which any records are required to be kept under the terms and conditions of this permit;

b) At reasonable times to have access to and copy any records required to be kept under the terms and conditions of this permit and to inspect any monitoring equipment or monitoring method required in the permit; and

c) To enter upon the permittee's premises to investigate, within reason, any actual, suspected, or potential source of water pollution, or any violation of the Colorado Water Quality Control Act. The investigation may include, but is not limited to, the following: sampling of any discharge and/or process waters, the taking of photographs, interviewing permittee staff on alleged violations, and access to any and all facilities or areas within the permittee's premises that may have any effect on the discharge, permit, or alleged violation. Such entry is also authorized for the purpose of inspecting and copying records required to be kept concerning any effluent source.

d) The Division shall split any sample taken with the permittee if requested to do so by the permittee.

2. Duty to Provide Information

The permittee shall furnish to the Division, within a reasonable time, any information which the Division may request to determine whether cause exists for modifying, revoking and reissuing, or terminating coverage under this permit, or to determine compliance with this permit. The permittee shall also furnish to the Division, upon request, copies of records required to be kept by this permit.

3. Transfer of Ownership or Control

Certification under this permit may be transferred to a new permittee if:

a) The current permittee notifies the Division in writing 30 days in advance of the proposed transfer date; and

b) The notice includes a written agreement between the existing and new permittees containing a specific date for transfer of permit responsibility, coverage and liability between them; and

c) The Division does not notify the existing permittee and the proposed new permittee of its intent to modify, or revoke and reissue the permit; and

d) The current permittee has met all fee requirements of the Regulations for the State Discharge Permit System, Section 6.16.0.

B. RESPONSIBILITIES cont.

4. Availability of Reports

Except for data determined to be confidential under Section 308 of the Federal Clean Water Act and Regulations for the State Discharge Permit System 6.6.4 (2), all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Division and the Environmental Protection Agency.

5. Modification, Suspension, or Revocation of Permits By the Division

All permit modification, termination or revocation and reissuance actions shall be subject to the requirements of the Regulations for the State Discharge Permit System, Sections 6.6.2, 6.6.3, 6.8.0 and 6.16.0, 5 C.C.R. 1002-2, except for minor modifications. Minor modifications may only correct typographical errors, require a change in the frequency of monitoring or reporting by the permittee, change an interim date in a schedule of compliance or allow for a change in ownership or operational control of a facility including addition, deactivation or relocation of discharge points where the Division determines that no other change in the permit is necessary.

a) This permit, and certification under this permit, may be modified, suspended, or revoked in whole or in part during its term for reasons determined by the Division including but not limited to, the following:

(i) Violation of any terms or conditions of the permit;

(ii) Obtaining a permit by misrepresentation or failing to disclose any fact which is material to the granting or denial of a permit or to the establishment of terms or conditions of the permit;

(iii) Materially false or inaccurate statements or information in the application for the permit, or;

(iv) A determination that the permitted activity endangers human health or the classified or existing uses of State Waters and can only be regulated to acceptable levels by permit modifications or termination.

b) This permit, or certification under this permit, may be modified in whole or in part due to a change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge, such as:

(i) There are material and substantial alterations or additions to the permitted facility or activity which occurred after permit issuance which justify the application of permit conditions that are different or absent in the existing permit;

B. RESPONSIBILITIES

5. Modification, Suspension, or Revocation of Permits By the Division cont.

b)

(ii) The Division has received new information which was not available at the time of permit issuance (other than revised regulations, guidance, or test methods) and which would have justified the application of different permit conditions at the time of issuance. For permits issued to new sources or new dischargers, this cause includes information derived from effluent testing required under Section 6.5.7(5) of the ***Regulations for the State Discharge Permit System***. This provision allows a modification of the permit to include conditions that are less stringent than the existing permit only to the extent allowed under Section 6.11.0 of the ***Regulations for the State Discharge Permit System***;

(iii) The standards or regulations on which the permit was based have been changed by promulgation of amended standards or regulations or by judicial decision after the permit was issued. Permits may be modified during their terms for this cause only as follows:

(a) The permit condition requested to be modified was based on a promulgated effluent limitation guideline, EPA approved water quality standard, or an effluent limitation set forth in 5 CCR 1002-3, § 10.1.0 et seq.; and

(b) EPA has revised, withdrawn, or modified that portion of the regulation or effluent limitation guideline on which the permit condition was based, or has approved a Commission action with respect to the water quality standard or effluent limitation on which the permit condition was based; and

(c) The permittee requests modification after the notice of final action by which the EPA effluent limitation guideline, water quality standard, or effluent limitation is revised, withdrawn, or modified; or

(d) For judicial decisions, a court of competent jurisdiction has remanded and stayed EPA promulgated regulations or effluent limitation guidelines, if the remand and stay concern that portion of the regulations or guidelines on which the permit condition was based and a request is filed by the permittee in accordance with this Regulation, within ninety (90) days of judicial remand;

(iv) The Division determines that good cause exists to modify a permit condition because of events over which the permittee has no control and for which there is no reasonable available remedy;

(v) The permittee has received a variance;

(vi) When required to incorporate applicable toxic effluent limitation or standards adopted pursuant to § 307(a) of the Federal act;

(vii) When required by the reopener conditions in the permit;

B. RESPONSIBILITIES

5. Modification, Suspension, or Revocation of Permits By the Division cont.

b)

(viii) As necessary under 40 C.F.R. 403.8(e), to include a compliance schedule for the development of a pretreatment program;

(ix) When the level of discharge of any pollutant which is not limited in the permit exceeds the level which can be achieved by the technology-based treatment requirements appropriate to the permittee under Section 6.9.2(1) *of the Regulations for the State Discharge Permit System*;

(x) To establish a pollutant notification level required in Section 6.9.5 *of the Regulations for the State Discharge Permit System*;

(xi) To correct technical mistakes, such as errors in calculation, or mistaken interpretations of law made in determining permit conditions, to the extent allowed in Section 6.11.0 *of the Regulations for the State Discharge Permit System*, or;

(xii) When required by a permit condition to incorporate a land application plan for beneficial reuse of sewage sludge, to revise an existing land application plan, or to add a land application plan.

(xiii) For any other cause provided in Section 6.11.0 *of the Regulations for the State Discharge Permit System*.

c) At the request of a permittee, the Division may modify or terminate a permit and issue a new permit if the following conditions are met:

(i) The Regional Administrator has been notified of the proposed modification or termination and does not object in writing within thirty (30) days of receipt of notification;

(ii) The Division finds that the permittee has shown reasonable grounds consistent with the Federal and State statutes and regulations for such modifications or termination;

(iii) Requirements of Section 6.16.0 *of the Regulations for the State Discharge Permit System* have been met, and;

(iv) Requirements of public notice have been met.

d) Permit modification (except for minor modifications), termination or revocation and reissuance actions shall be subject to the requirements of Sections 6.6.2, 6.6.3, 6.7.0, 6.8.0 and 6.16.0 of the Regulations for the State Discharge Permit System. The Division shall act on a permit modification request, other than minor modifications requests, within 180 days of receipt thereof. Except for minor modifications, the terms of the existing permit govern and are enforceable until the newly issued permit is formally modified or revoked and reissued following public notice.

B. RESPONSIBILITIES

5. Modification, Suspension, or Revocation of Permits By the Division cont.

   e) Upon consent by the permittee, the Division may make minor permit modifications without following the requirements of Sections 6.6.2, 6.6.3, 6.8.0, and 6.16.0 of the Regulations for the State Discharge Permit System. Minor modifications to permits are limited to:

      (i) Correcting typographical errors; or

      (ii) Increasing the frequency of monitoring or reporting by the permittee; or

      (iii) Changing an interim date in a schedule of compliance, provided the new date of compliance is not more than 120 days after the date specific in the existing permit and does not interfere with attainment of the final compliance date requirement; or

      (iv) Allowing for a transfer in ownership or operational control of a facility where the Division determines that no other change in the permit is necessary, provided that a written agreement containing a specific date for transfer of permit responsibility, coverage and liability between the current and new permittees has been submitted to the Division; or

      (v) Changing the construction schedule for a discharger which is a new source, but no such change shall affect a discharger's obligation to have all pollution control equipment installed and in operation prior to discharge; or

      (vi) Deleting a point source outfall when the discharge from that outfall is terminated and does not result in discharge of pollutants from other outfalls except in accordance with permit limits; or

   f) When a permit is modified, only the conditions subject to modification are reopened. If a permit is revoked and reissued, the entire permit is reopened and subject to revision and the permit is reissued for a new term.

   g) The filing of a request by the permittee for a permit modification, revocation and reissuance or termination does not stay any permit condition.

6. Oil and Hazardous Substance Liability

   Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject to under Section 311 (Oil and Hazardous Substance Liability) of the Clean Water Act.

7. State Laws

   Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation under authority granted by Section 510 of the Clean Water Act.

B. RESPONSIBILITIES cont.

8. Permit Violations

Failure to comply with any terms and/or conditions of this permit shall be a violation of this permit.

9. Property Rights

The issuance of this permit does not convey any property or water rights in either real or personal property, or stream flows, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations.

10. Severability

The provisions of this permit are severable. If any provisions of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances and the application of the remainder of this permit shall not be affected.

11. Renewal Application

If the permittee desires to continue to discharge, a permit renewal application shall be submitted at least one hundred eighty (180) days before this permit expires. If the permittee anticipates there will be no discharge after the expiration date of this permit, the Division should be promptly notified so that it can terminate the certification in accordance with Part II.B.5.

12. Confidentiality

Any information relating to any secret process, method of manufacture or production, or sales or marketing data which has been declared confidential by the permittee, and which may be acquired, ascertained, or discovered, whether in any sampling investigation, emergency investigation, or otherwise, shall not be publicly disclosed by any member, officer, or employee of the Commission or the Division, but shall be kept confidential. Any person seeking to invoke the protection of this Subsection (2) shall bear the burden of proving its applicability. This section shall never be interpreted as preventing full disclosure of effluent data.

13. Fees

The permittee is required to submit payment of an annual fee as set forth in the 1983 amendments to the Water Quality Control Act. Section 25-8-502 (l) (b), and State Discharge Permit Regulations 5CCR 1002-2, Section 6.16.0 as amended. Failure to submit the required fee when due and payable is a violation of the permit and will result in enforcement action pursuant to Section 25-8-601 et. seq., C.R.S. 1973 as amended.

B. RESPONSIBILITIES cont.

14. Requiring an Individual CDPS Permit

The Director may require any owner or operator covered under this permit to apply for and obtain an individual CDPS permit if:

a) The discharger is not in compliance with the conditions of this general permit;

b) Conditions or standards have changed so that the discharge no longer qualifies for a general permit; or

c) Data become available which indicate water quality standards may be violated.

The owner or operator must be notified in writing that an application for an individual CDPS permit is required. When an individual CDPS permit is issued to an owner or operator otherwise covered under this general permit, the applicability of the general permit to that owner or operator is automatically terminated upon the effective date of the individual CDPS permit.

15. Requesting an Individual CDPS Permit

Any owner or operator covered by this general permit may request to be excluded from the coverage by applying for an individual CDPS permit.

16. Requesting Coverage Under the General Permit

The owner or operator of a facility excluded from coverage by this general permit solely because that facility already has an individual permit may request that the individual permit be revoked and that the facility be covered by this general permit. Such request shall be evaluated by the Division as per the criteria specified in Part I of this permit.

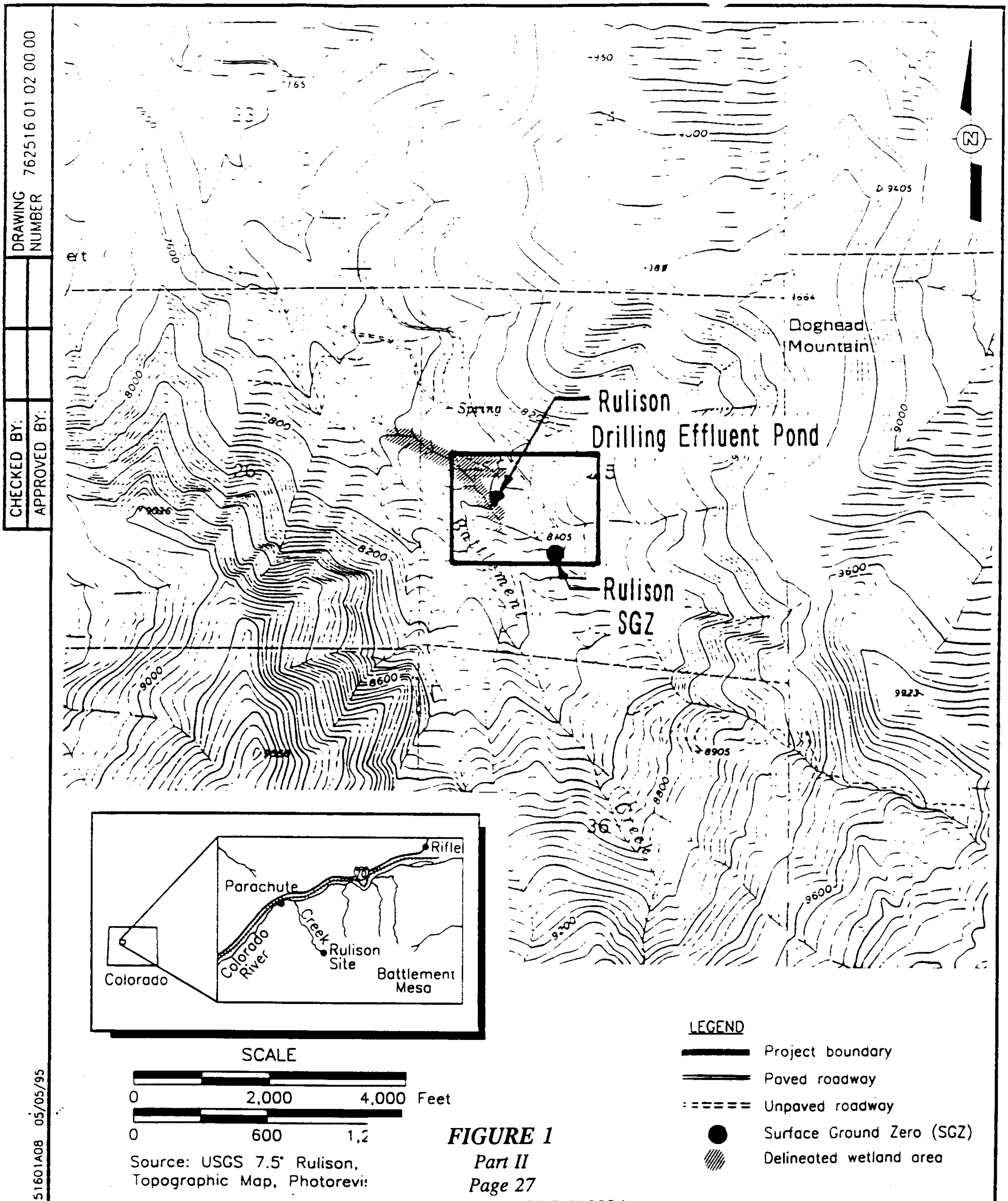

FIGURE 1
Part II
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Certification No. COG-310084

Project Rulison Location Map
Garfield County, Colorado

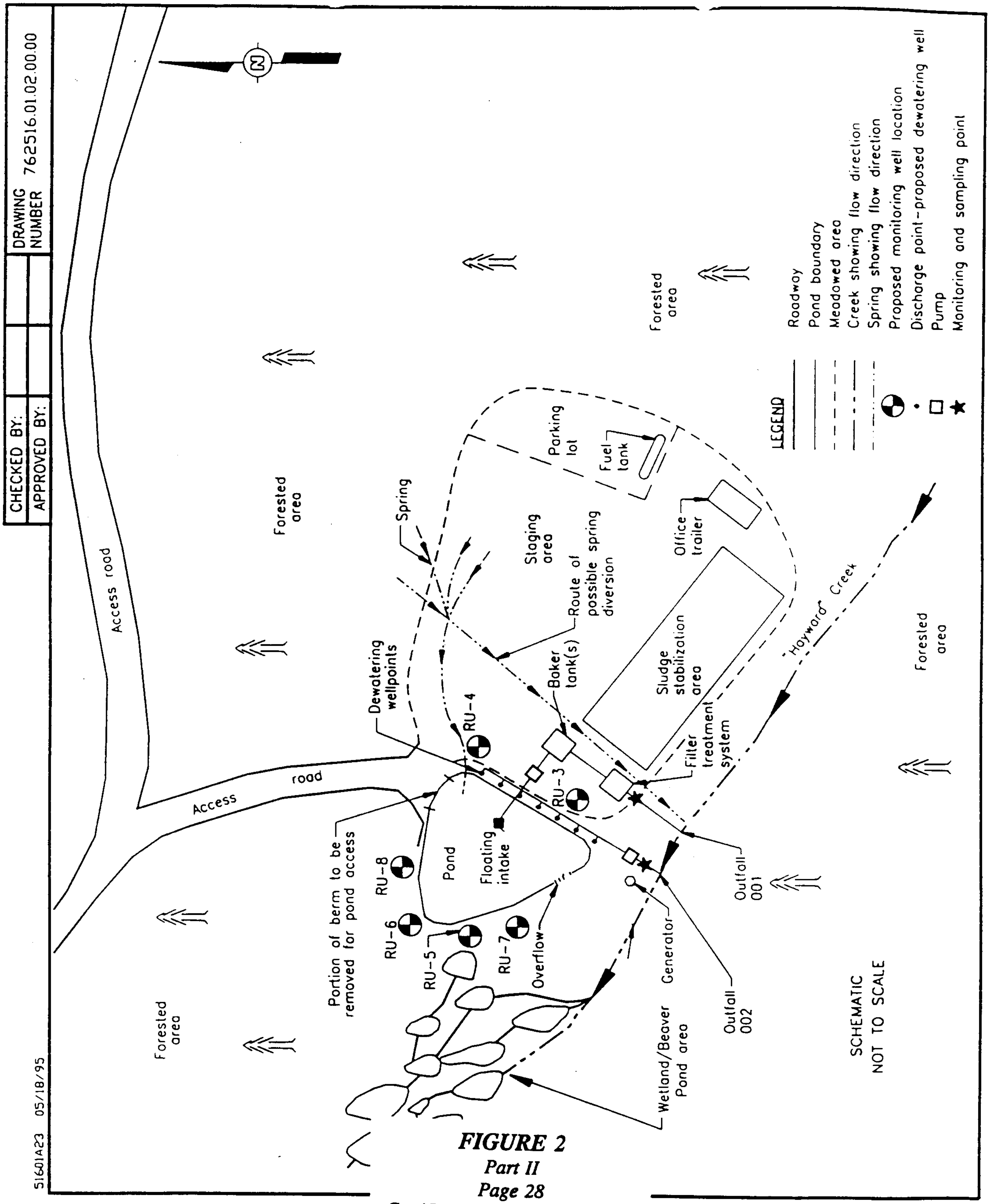

FIGURE 2
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Certification No. COG-310084

Project Rulison Site Sketch
Garfield County, Colorado

COLORADO DEPARTMENT OF HEALTH
Water Quality Control Division
4210 East 11th Avenue
Denver, Colorado 80220

AMENDMENT #1

RATIONALE

GROUNDWATER CLEANUP OF GASOLINE

GENERAL PERMIT IN COLORADO

COLORADO DISCHARGE PERMIT NUMBER COG-310000

PURPOSE OF AMENDMENT:

The Division has initiated this amendment to the general permit to include a Flow Volume Exemption, as follows.

The permit is currently written to allow a maximum discharge of 0.05 MGD, or about 35 gpm. This excludes larger facilities from coverage under the general permit. The larger facilities then need to apply for an individual permit, which is desirable so that more frequent monitoring and/or other more stringent controls may be applied. This additional control is needed for on-going systems. However, this restriction has also resulted in a lack of flexibility in applying this permit. Therefore, the Flow Volume Exemption will be applied under two separate circumstances, as follow:

1) Several cases have arisen at sites contaminated or potentially contaminated by gasoline, where discharge is of a temporary nature for construction dewatering, and is expected to last for a matter of weeks. Such projects typically involve larger volumes of water, and may be on a tighter schedule which does not allow time for application for an individual permit. Therefore, the general permit will be amended so that the maximum flow limit of 0.05 MGD is deleted, for a period not to exceed 30 days, for temporary dewatering sites. This provision will be approved by the Division on a case-by-case basis.

2) Many operators of groundwater cleanup sites wish to begin groundwater remediation as quickly as possible to prevent further spread of the contamination, but larger facilities may not be able to because of the flow restriction. Therefore, if the flow from a groundwater remediation site as defined in this permit is greater than 0.05 MGD, and the Division determines that there is no other reason why cleanup should not begin immediately, then the permittee may be temporarily certified under this general permit (with no flow limit) while going through the application process for an individual permit. However, the permittee must agree to perform additional monitoring and/or any other requirements the Division may impose during this interim time. These requirements will be covered outside of the permit by letter. Noncompliance with the additional requirements could result in revocation of the permittee's certification under the general permit.

PURPOSE OF AMENDMENT:

Therefore, the general permit will be amended to remove the maximum discharge limit of 0.05 MGD, for the two situation described above.

The Division reserves the right to refuse a facility coverage under the exemption. The flow volume, level of organics in the effluent, quality of receiving waters, and/or lack of information on the treatment system capability will be evaluated. The Division will use best professional judgment in determining whether or not the exemption will provide adequate coverage for the discharge.

The temporary dewatering projects which use the Flow Volume Exemption have the option of remaining under the general permit beyond the initial period, provided that the 0.05 MGD flow limit is met after the initial 30 days. The 30 day time period will start with the first day of dewatering, and end 30 days after that, regardless of how many days dewatering actually took place in the interim. The permittee must notify the Division in writing if it intends to use the permit beyond 30 days.

Any request for a Flow Volume Exemption must be included with the permittee's permit application. See the individual Certification Rationale to determine whether or not the exemption is allowed. In any event, no temporary flow increase is allowed without prior Division approval.

Page 2 of the permit has been amended. Page 2a has been added. All other permit requirements shall remain the same.

Kathryn Dolan
July 16, 1991

PUBLIC NOTICE:

No changes were made to the permit as a result of public notice.

Kathryn Dolan
April 13, 1992

COLORADO DEPARTMENT OF HEALTH
Water Quality Control Division
4210 East 11th Avenue
Denver, Colorado 80220

RATIONALE

GROUNDWATER CLEANUP OF GASOLINE

GENERAL PERMIT IN COLORADO

COLORADO DISCHARGE PERMIT NUMBER COG-310000

CONTENTS

I. INTRODUCTION

Facilities performing cleanup of gasoline from contaminated groundwater are located in many areas in Colorado. Waters discharged from these facilities to state waters are subject to the requirements of the State of Colorado "Water Quality Control Act," 1973 as amended. Section 6.10.2 of the "Colorado Discharge Permit System Regulations" provides for the issuance of general permits where covered facilities:

1. involve the same or substantially similar types of operations;
2. discharge the same types of wastes;
3. require the same effluent limitations or operating conditions;
4. require the same or similar monitoring; and
5. are more appropriately controlled under a general permit than under individual permits.

Administrative delays in the issuance of a permit to implement remediation might significantly impact the timing and cost of a project, as well as allow the contamination to spread farther. The Water Quality Control Division (the Division) has determined that facilities performing groundwater cleanup from gasoline contamination are, in many cases, suitable for coverage under a general permit.

II. INDUSTRY DESCRIPTION

It is estimated (by the Hazardous Materials and Waste Management Division) that there are approximately 25,000 underground storage tanks (USTs) in Colorado, the majority of which are used for storing petroleum products. Variables such as the tank size, age, construction and method used to install and operate the tank dictate the probability of the tank eventually leaking into the environment. The percentage of USTs in Colorado which are leaking into the surrounding environment is unknown at this time. However, past construction practices often did not take into account concerns about leakage, and so contamination of the groundwater has resulted at many sites.

Due to the increased attention (including national legislation) on this issue, many of these contaminated sites have been discovered and are undergoing remediation. Cleanup often consists of pumping contaminated groundwater, treating it, and then discharging the treated effluent to surface waters or a municipal sewer system, land applying it, or re-injecting it back into the ground. For discharges of this treated water to surface waters (including storm sewer systems), a Colorado Discharge Permit System permit is required.

Gasoline products are mixtures of hydrocarbon compounds with a broad range of physical, chemical and toxicological properties and chemical composition. Consequently, the concentration of pollutants in wastewaters generated from leaking USTs is highly variable. Of the types of hydrocarbons found in gasoline, the aromatics are generally considered to be the most toxic, and therefore pose the greatest potential for impact on human health and the environment. Some of the parameters known to be present in gasoline are benzene, toluene, ethylbenzene and xylene. Their concentrations in contaminated groundwater will vary depending on the fuel composition and the volatility and solubility of the compound. They will be limited in the permit based on water quality criteria and/or cleanup technology. Organic lead, added to some gasolines in the form of tetraethyllead, must also be addressed. Tetraethyllead is toxic to fish larvae at low levels (Ref. H). This may lead to problems with the effluent passing WET testing.

A. Treatment Technologies

The cleanup operation usually involves two phases. The first phase includes actions designed to immediately contain and control a release. The second phase involves assessing and developing long term measures designed to rectify and mitigate contamination to a level which will protect human health and the environment.

An UST cleanup typically begins with an effort to recover free product (i.e., gasoline). This recovery is usually accomplished through the use of a trench (where the fuel collects and is skimmed off), or a pumping well system. A dual pump system uses separate pumps to collect fuel and water, while a single pump system sends the fuel/water mix to an above-ground oil/water separator. In each case,

II. INDUSTRY DESCRIPTION

the recovered fuel is sent off-site for disposal or re-processing. The wastewater from the oil/water separator may still contain some of the fuel; this is the main source of the contaminants of concern in the discharge.

This wastewater may then be discharged directly from the oil/water separator when there are no contaminants, or treated in a variety of ways. One common and relatively economical method of treatment is air stripping. This involves providing contact between air and water to allow the volatile substances to diffuse from the liquid to the gaseous phase. There are several methods of air stripping, including diffused aeration, tray aerators, spray basins, and packed towers. The packed tower type is the most efficient, and consists of wastewater sprayed down over media as air is blown up through the tower.

There are several factors which affect the ability of air stripping to remove organic pollutants. Air stripping is most amenable to organic compounds with a Henry's Constant value greater than 0.1. (Henry's Constant is a coefficient which describes the tendency for a substance to partition between the liquid and gas phases.) The efficiency of air stripping is also controlled by the temperature of the wastewater and the intensity or duration of the aeration. It may be necessary to heat the wastewater prior to air stripping, and/or to recycle the wastewater or add more treatment units to achieve the necessary removal efficiencies. Because of the limited area required for these facilities, and the lack of a need to change the media, this method is economical in many situations. It should be noted that there may be air pollution considerations with this type of treatment (Ref. F).

Another common treatment method is granular activated carbon adsorption, used either separately or in combination with air stripping. Activated carbon is more expensive than airstripping. Use of activated carbon systems is most effective on influent with low levels of organics present. The wastewater is brought into contact with the activated carbon, which then selectively adsorbs organic constituents into the internal pores of the carbon granules. As solubility of the compound decreases, the compound is more likely to be adsorbed. Thus, factors which will affect the solubility of the compound, such as pH and temperature, will affect how well a substance is removed via carbon adsorption. It is suggested (Ref. D) that organic lead may be removed by activated carbon. Laboratory tests put this removal at 58-96%.

The carbon in such systems needs to be regenerated or replaced on a routine basis, which adds to the cost of the treatment. In addition, use of activated carbon may be impractical if the wastewater contains high levels of iron and manganese, which can use up the adsorptive capacity of the carbon and thus not allow it to fully remove the organics (Ref. F).

II. INDUSTRY DESCRIPTION

Other methods for treatment of organics include bioremediation, reverse osmosis, ozonation and ultraviolet irradiation. These methods are still being developed. As they are refined and become more cost effective, their use will become more widespread. This permit does not specify the type of treatment to be used, and so does not require that any of these methods be used. It should be noted that no one treatment method is applicable to all organics. Treatment systems, if needed, must be chosen which work best given the specific site and wastewater characteristics.

III. COVERAGE UNDER THIS PERMIT

Under this general permit, owners and operators of groundwater cleanup operations for gasoline or aviation gasoline may be granted authorization to discharge treated groundwater into waters of the State of Colorado. Other petroleum products, such as aviation turbine fuel, kerosene, and diesel fuel are not covered under this permit.

Authorization under the permit shall require prior submittal of certain facility information. Upon receipt of all required information, the permit issuing authority may allow or disallow coverage under the general permit.

The following list shows the criteria which will be used in evaluating whether or not an individual permit may be required instead of a general permit:

1. proximity of the operation to a landfill or mine and mill tailings;
2. evidence of significant noncompliance under a previous permit for the operation;
3. an effluent flow greater than 0.05 MGD (50,000 gpd);
4. the need to preserve high quality water;
5. addition of flocculants (settling agents or chemical additives) to water prior to discharge;
6. use of chemicals (such as chlorine) within the treatment system;
7. failure of the effluent to pass a Whole Effluent Toxicity (WET) test;
8. lead or organics levels in the effluent which could lead to a violation of the receiving waters instream water quality standard for lead or organics, respectively;
9. presence of downstream drinking water intakes or a fishery;
10. an anti-degradation review by the Division showing that the discharge would cause unallowable degradation to the receiving waters.

IV. APPLICATION AND CERTIFICATION

At least thirty days prior to the anticipated date of discharge, the owner, operator and/or authorized agent for a facility shall submit an application as provided by the Division. This application will be evaluated utilizing the criteria outlined previously. If the general permit is applicable to the applicant's operation, then a rationale will

IV. APPLICATION AND CERTIFICATION

be developed and the applicant will be certified under this general permit. The rationale shall include, at a minimum, the name and address of the contact person, the person responsible for the operation, a description of the facility, the receiving water, the number of outfalls, and the calculations to determine ~~the Instream Waste Concentration (IWC) and~~ the benzene limit. A determination on the need for salinity monitoring and a lead limit shall also be included.

The Division shall have up to thirty days after receipt of the above information to request additional data and/or deny the authorization for any particular discharge. Upon receipt of additional information, the Division shall have an additional 30 days to issue or deny authorization to discharge.

If the applicant does not receive a request for additional information or a notification of denial from the Division within 30 days, authorization to discharge in accordance with the conditions of the permit shall be deemed granted.

If, after evaluation of the application, it is found that the general permit is not applicable to the operation, then the application will be processed as one for an individual permit. The applicant will be notified of the Division's decision to deny certification under this general permit. For an individual permit, 180 days will be required to process the application and issue the permit. In this case, a discharge cannot take place until the permit is issued and becomes effective.

An existing source may request coverage under the general permit. If, after evaluation of the application for an existing source which is already covered under an individual permit, it is found that the general permit is not applicable to the operation, then the applicant will continue operation under the existing individual permit.

If facility conditions change such that coverage under the general permit is no longer applicable, the permittee will be required by the Division to apply for an individual permit. Determination of toxicity of the effluent alone is grounds for the Division to convert the facility to coverage under an individual permit. Coverage will continue under the general permit until issuance of the individual permit.

V. TERMS AND CONDITIONS OF PERMIT

A. Effluent Limitations

In developing suitable effluent limitations, the Division must review all applicable standards and regulations and apply that which is more stringent. This review includes, but is not limited to, the water quality standard-based effluent limitations, federal guidelines and standards (40 CFR Subchapter N) and "Regulations for Effluent Limitations" (Ref. B). Such a review has been done for this permit. The following limits will apply and are discussed in Table V-1.

V. TERMS AND CONDITIONS OF PERMIT

Table V-1 — Effluent Limits

Parameter	Limit	Rationale
Flow, MGD	See Certification	Design
TSS, mg/l	30/45 a/	State Effluent Regulations
pH, s.u.	6.5-9.0 b/	Water Quality Standards
Oil and Grease, mg/l	10 c/	State Effluent Regulations
Potentially Dissolved Lead, mg/l (only if required)	0.031 c/d/	Water Quality Standards
Benzene, mg/l	See Certification	Basic Water Quality Standards
BETX, mg/l	0.1 c/	Best Professional Judgment
Whole Effluent Toxicity, Acute	See Discussion	Discharge Permit Regulations
T. Dissolved Solids, mg/l (Colo. River Basin only)	Monitor Only	Salinity Regulations

a/ 30-Day Average/7-Day Average
b/ Minimum-Maximum
c/ Daily Maximum
d/ The lead limit is applicable only to those facilities which discharge to streams which have an instream lead limit, or which could impact such a stream.

1. Water Quality Standard-Based Effluent Limitations:

a) Lead: For individual permits, a mass balance equation is used to determine the effluent concentrations for lead, the limits for which are based on the water quality standards. However, due to the complexity of the calculations for this parameter and the time constraints involved in issuing a general permit certification, it is not feasible to include such a calculation-based limit in a general permit. Therefore, a limit for potentially dissolved lead of 0.031 mg/l (daily maximum) will be imposed. This is based on an assumption of worst-case conditions: minimal dilution provided by the receiving stream, and an instream hardness value of 50 mg/l, applying the table value for lead as outlined in the "Basic Standards and Methodologies for Surface Water" (Ref. A). Although this may be a stricter limit for some facilities than a calculation-based one would be, the permittee still has the option of applying for an individual permit in order to come under the calculation-based limit.

V. TERMS AND CONDITIONS OF PERMIT

The lead limit will only be applicable to those facilities which discharge to streams which have an instream lead limit, or which could impact such a stream. Monitoring for lead will be required at all facilities.

See the individual Certification Rationale for the receiving stream, and a discussion on whether a lead limit is applicable to the individual facility.

b) <u>Benzene</u>: Benzene is a commonly found contaminant in fuel cleanups. Benzene is limited in the "Basic Standards and Methodologies for Surface Water," 3.1.11. A mass balance equation is used to determine the effluent concentration for this parameter. The mass balance equation is:

$$M_2 = \frac{M_3Q_3 - M_1Q_1}{Q_2}$$

Where: Q_1 = Upstream low flow
Q_2 = Effluent flow (chronic)
Q_3 = Combined downstream flow ($Q_1 + Q_2$)
M_1 = Upstream background pollutant concentration
M_2 = Unknown; effluent pollutant concentration
M_3 = Basic Water Quality Standard

The Division does not have instream data available for benzene. Therefore, the background level (M_1) is assumed to be zero. The value for M_3 varies depending on the receiving water classification. For a water supply, the instream chronic limit is 0.005 mg/l. For an aquatic life classification, the instream acute limit is 5.3 mg/l. The effluent flow used (Q_2) is the 30 day average flow from the facility, since the acute limit will not be applied. The upstream low flow (Q_1) is calculated by the Division using a set protocol.

If the calculated benzene limit is greater than 0.1 mg/l, then the BETX limit of 0.1 mg/l (as discussed below) will dictate the maximum benzene level allowed, and so a separate benzene limit will not be included. (This is why, for receiving waters which are classified for aquatic life, the benzene calculation is not appropriate, since the instream limit is already greater than the BETX limit.) Monitoring for benzene will still be required for all facilities, however. If the calculated benzene limit is equal to or less than 0.1 mg/l, it will be applied to the facility.

V. TERMS AND CONDITIONS OF PERMIT

See the individual Certification Rationale for the actual calculation, and a discussion on which limit the individual facility will be required to meet.

2. Applicable Federal Effluent Guidelines and Standards: Although no federal guidelines have been promulgated for this type of facility, EPA has come out with guidance on such permits (Ref. E). This guidance was used in developing a technology-based limit for BETX.

BETX means the combined total of benzene, ethylbenzene, toluene and xylenes in the effluent. It is a common petroleum industry practice to determine the quality of fuels by measuring BETX.

Monitoring and limitation of BETX in discharges from this type of facility is prudent for several reasons. First, the composition of gasoline is highly variable and for some gasoline products, any one of the four BETX constituents can be the predominant constituent. Second, EPA has promulgated or proposed water quality criteria for benzene, ethylbenzene, toluene and the xylenes. Except for napthalene, criteria have not been proposed for the other constituents of gasoline. Also, the constituents of BETX have low Henry's Law Constants, which means they are not as easily air stripped as other gasoline constituents, and so are a good indicator of treatment effectiveness.

The BETX limit is derived using Best Professional Judgment of what the Best Available Technology is for treating the wastewater. According to EPA, the potential removal efficiency of BETX using a commercially available air stripper unit is 99.5 percent. If air stripping is applied to influent BETX levels of 15 mg/l (the estimated maximum influent level of BETX after the product recovery phase), the stripped effluent would contain 0.075 mg/l total BETX. Since product recovery and air stripping technologies may not always occur under optimal conditions, the total BETX discharge limit will be slightly increased to 0.1 mg/l (daily maximum).

3. Regulations for Effluent Limitations: The "Regulations for Effluent Limitations" (Ref. B), apply to the conventional pollutants. For this permit, the limitations for TSS and Oil and Grease are based on this regulation.

4. Discussion of Limitations:

a) Flow: A flow limit is included in the permit, due to the benzene limit being flow-based for some facilities. The flow limit used will be the 30 day average flow (design) from the facility, since the limits imposed are chronic (30 day average). See the individual Certification Rationale for the flow limit applicable to the individual facility.

V. TERMS AND CONDITIONS OF PERMIT

b) Salinity: Salinity, or total dissolved solids (TDS) is an issue in the Colorado River Basin. Regulation 3.10.0, "Regulations for Implementation of the Colorado River Salinity Standards Through the Colorado Discharge Permit Program," addresses the discharge of TDS to the Colorado River Basin. It is a requirement of the regulation that the salinity of each discharge in the Colorado River Basin be evaluated for impact on the system. Generally, the net impact on salinity to the basin from groundwater cleanup activities is expected to be negligible, because the waters are typically shallow groundwaters which will eventually reach the river, and because the discharge volume is usually low. Nonetheless, the State reserves the right to refuse the applicability under the general permit of any groundwater cleanup operation, if it appears that the discharge will not be consistent with the regulation.

Additionally, quarterly monitoring for TDS will be a permit requirement for all facilities located in the Colorado River Basin. Should the data identify a problem, the State will have the right to require the facility to obtain an individual permit, whereby a study addressing the economic feasibility of salt removal can be required. See the individual Certification Rationale that accompanies the permit for the Division's determination of whether or not salinity monitoring is required.

5. Whole Effluent Toxicity (WET) Testing: For this facility, acute WET testing is required. (See Parts I.B and I.C of the permit, as well as the individual Certification Rationale.) Monitoring shall be performed commencing with the first full calendar quarter following the certification effective date.

a) Purpose of WET Testing: Section 6.9.7 of the "Regulations for the State Discharge Permit System" (Ref. C), passed by the Water Quality Control Commission, has established the use of WET testing as a method for identifying and controlling toxic discharges from wastewater treatment facilities. WET testing is being utilized as a means to ensure that there are no discharges "in amounts, concentrations or combinations which are harmful to the beneficial uses or toxic to humans, animals, plants, or aquatic life" as required by Section 3.1.11 (1)(d) of the Basic Standards and Methodologies.

Chemical analysis of effluent has provided only a partial evaluation of the potential impact a discharge could have on the receiving stream. Also, chemical analysis cannot evaluate the synergistic or antagonistic effect of compounds. There are also

V. TERMS AND CONDITIONS OF PERMIT

compounds for which an accurate or reproducable method of chemical analysis has not yet been developed, as well as compounds which are just beginning to be evaluated for toxic effects. WET testing will provide a more comprehensive means of evaluating the toxicity of a discharge than could otherwise currently be accomplished.

b) Species Toxicity: As a condition of the permit, the permittee will be required to conduct routine monitoring for acute toxicity using two species, *Ceriodaphnia* sp. (water flea) and fathead minnows. Acute toxicity occurs when a species mortality in any dilution of effluent (including 100% effluent) exceeds 50% for either species, or there is a statistically significant difference in the mortality observed for either species between the control and any effluent concentration.

Should acute toxicity be detected, discharge must be halted immediately. The permittee must submit a report to the Division within 5 days of the toxicity being detected, outlining the steps proposed to determine the cause of the toxicity. In most cases, this will involve conducting a series of accelerated tests to show whether the toxicity was continuous or an isolated incident. (Effluent from this type of facility is expected to be relatively consistent.) In those cases where a real or potential WET problem has been established, the permittee must apply for coverage under an individual permit, which will include imposition of WET limits. (Steps must also be taken to identify the source of toxicity, and propose suitable treatment, before an individual permit can be issued.)

The permittee should read the WET testing sections of Part I.B and I.C of the permit carefully, and should note that the test methods for the toxicity tests are described in detail in the Division guidance document, Guidelines for Conducting Whole Effluent Toxicity Tests. This document should be read thoroughly prior to commencing the required WET testing, to ensure that the permittee is aware of the various test conditions that could affect the test results (e.g., sample holding time).

The permittee should be aware that eligibility for coverage under the general permit may change if the facility experiences a change in discharge, as outlined in Part II.A.1 of the permit. Such changes shall be reported to the Division immediately.

V. TERMS AND CONDITIONS OF PERMIT

B. Monitoring and Reporting

1. Monitoring: Table V-2 lists the monitoring requirements for this permit, including sample type and frequency.

Table V-2 — Monitoring Requirements

Parameter	Measurement Frequency	Sample-Type
Flow, MGD	Weekly	Instantaneous or Continuous
Total Suspended Solids, mg/l	Monthly	Grab
pH, s.u.	Weekly	Grab
Oil and Grease	Weekly	Visual
Oil and Grease, mg/l	Monthly	Grab
Potentially Dissolved Lead, mg/l	Monthly	Grab
Benzene, mg/l	Monthly	Grab
BETX, mg/l	Monthly	Grab
Whole Effluent Toxicity, Acute	Quarterly	Grab
T. Dissolved Solids, mg/l (Colo. River Basin only)	Quarterly	Grab

2. Reporting: The permittee must submit a Discharge Monitoring Report (DMR) on a monthly basis to the Division. This report should contain the required summarization of the test results for parameters shown in Table V-2 and Part I.C.1 of the permit. See the permit, Part I.C.2 for details on such submission.

3. Additional Monitoring and Reporting: In addition to the routine monitoring discussed above, the permittee will be required to monitor for the entire volatile fraction of the organic toxic pollutants, once per year, beginning within three months of the effective date of the certification. If the new data indicate the presence of any organics at levels which might violate the organic pollutant standards contained in tables A, B and C of "The Basic Standards and Methodologies for Surface Water" (Ref. A), the Division reserves the right to require the facility to obtain an individual permit.

C. Additional Terms and Conditions

1. Spill Containment: As most facilities provide bulk storage of some volume of gasolines or other chemicals, the permit will require

V. TERMS AND CONDITIONS OF PERMIT

1. Spill Containment: (Cont.) adequate protection from spills for such facilities so as to prevent loss of these materials into discharged waters. Such protection can take various forms; however, diking in most cases will prove to be the most cost effective. This provision is required as the Division interprets proper operation as properly addressing potential pollutant sources before problems occur.

   Spill reports will only be required in cases of noncompliance with permit conditions. The permittee will, however, be required to maintain its records for a period of three years. Such records will be subject to inspection by EPA and/or the Division.

2. Duration of Permit: The permit shall not exceed five years in duration. The permittee's authority to discharge under this permit is approved until the expiration date of the general permit. The permittee must apply for recertification under the general permit at least 180 days prior to its expiration date.

Kathryn Dolan
November 15, 1989

D. Changes Following Public Notice

The following changes were made in the permit after review of comments received during the public notice period:

1. Coverage of diesel fuel contamination was deleted, due to the constituents of diesel fuel, which are best determined by analyses for acid and base-neutral organics, not volatiles.

2. Coverage for facilities with effluent volumes over 0.05 MGD was deleted, so that more frequent monitoring could be applied to larger facilities. However, such operations could still apply for temporary coverage under the general permit, if they met the 0.05 MGD flow limit while an individual permit is processed.

3. The requirement that discharge be immediately terminated if toxicity is identified is clarified.

4. A requirement has been added stating that if discharge is to a storm sewer system, approval from the owner of the system must be obtained prior to certification.

Kathryn Dolan
May 9, 1990

VI. REFERENCES

A. Colorado Dept. of Health, Water Quality Control Commission. Basic Standards and Methodologies for Surface Water (3.1.0). Denver: CDH, as revised 8/7/89.

B. Colorado Dept. of Health, Water Quality Control Commission. Regulations for Effluent Limitations (10.1.0). Denver: CDH, as revised 1/6/86.

C. Colorado Dept. of Health, Water Quality Control Commission. Regulations for the State Discharge Permit System (6.1.0). Denver: CDH, as revised 8/31/89.

D. Patterson, James W. Industrial Wastewater Treatment Technology, Second Edition. Boston: Butterworths, 1985.

E. U.S. Environmental Protection Agency. Model NPDES Permit for Discharges Resulting from the Cleanup of Gasoline Released from Underground Storage Tanks. Wash., D.C.: U.S. Gov't Printing Office, 6/89.

F. U.S. Environmental Protection Agency. Cleanup of Releases from Petroleum USTs: Selected Technologies (EPA/530/UST-88/001). Wash., D.C.: U.S. Gov't Printing Office, 4/88.

G. State of Utah, Division of Environmental Health. General Permit for Treated Groundwater Contaminated with Petroleum Products (draft). State of Utah, 2/89.

H. Verschueren, Karel. Handbook of Environmental Data on Organic Chemicals, Second Edition. New York: Van Nostrand Reinhold Company, 1983.

A-2 Amended Certification, Colorado Wastewater Discharge Permit. August 14, 1995.

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STATE OF COLORADO

Roy Romer, Governor
Patti Shwayder, Acting Executive Director

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Colorado Department
of Public Health
and Environment

August 14, 1995

U.S. Department of Energy
Roxanne Danz
P.O. Box 98518
Las Vegas, Nevada 89193-8518

CERTIFIED MAIL NO: Z 416 968 879

RE: Amended Certification, Colorado Wastewater Discharge Permit System: Permit Number: COG-310084, U.S. Department of Energy

Dear Ms. Danz:

Enclosed please find a copy of your amended certification which was issued under the Colorado Water Quality Control Act. This permit requires that specific actions be performed at designated times. You are legally obligated to comply with all terms and conditions of the permit and certifications. It is especially important to note the effective date which can be found on page one of the Certification. It is illegal to discharge per the conditions of this permit until that date.

Please read the permit and if you have any questions contact this office at 692-3590.

Sincerely,

Robert J. Shukla

Robert J. Shukla, Chief
Permits and Enforcement Section
Water Quality Control Division

xc: Permits Section, Environmental Protection Agency
Regional Council of Government
Local County Health Department
District Engineer, Field Support Section, WQCD
Derald Lang, Field Support Section, WQCD
Permit Drafter, Permits and Enforcement Section, WQCD

Enclosure

COLORADO DISCHARGE PERMIT SYSTEM
AMENDMENT TO THE CERTIFICATION
GROUNDWATER CLEANUP OF GASOLINE
Category 07, Sub-category 8, General Permits, Gasoline cleanup Current fee $850/year per CRS 25-8-502
SIC code 1629

- *This amendment specifically authorizes,* *U.S. Department of Energy*
Roxanne Danz
P.O. Box 98518
Las Vegas, Nevada 89193-8518
(702)+295-7723

with the facility contact of, *Same as above*

to discharge from facility identified as ***Drilling Effluent Pond*** *project, located in the SW 1/4, Section 25, T7S, R95W; Garfield County as shown in Figure 1 of the permit from discharge points identified as 001-002, as shown in Figure 2 of the Permit and further described in this table,*

Discharge Point	Description	Estimated Flow Rate
001	Discharge from the drilling effluent pond following treatment prior to entering Hayward Creek.	Avg. = 25 gpm Max. = 500 gpm
002	Discharge from the wellpoints following treatment prior to entering Hayward Creek.	Max. = 150 gpm Avg. = 75 gpm

The discharge goes to Hayward Creek, which is within Segment 7, Lower Colorado River Sub-basin, Lower Colorado River Basin, found in 3.7.0 Classifications and Numeric Standards for the Lower Colorado River Basin (5 CCR 1002-8). Segment 7 is classified for the following uses: Recreation, Class 2; Aquatic Life, Class 1 (cold); Agriculture; Water Supply. The Division reviewed this facility on 6/12/95 and determined that the antidegradation presumption was overcome because the discharge is temporary (1 week).

The activity involves cleanup of sediment contaminated with petroleum hydrocarbons and metals. Surface water showed very low or non-detectable levels of petroleum hydrocarbons and toxic metals. Discharge will be treated by on-site activated carbon filters.

The flow limitation of 0.05 MGD will be waived due to the short duration of this discharge.

Table V-1 - Effluent Limits for Discharge Point 001.

Parameter	Limitation		Rationale
Flow, MGD	Report	d/	
TSS, mg/ℓ	30/45	a/	State Effluent Regulations
pH, s.u.	6.5-9.0	b/	Water Quality Standards
Oil and Grease, mg/ℓ	10	c/	State Effluent Regulations
Potentially Dissolved Lead, mg/ℓ *	0.031	c/	Water Quality Standards
Benzene, mg/ℓ	0.001	d/	Best Professional Judgment
BETX, mg/ℓ	0.1	c/	Basic Water Quality Standards
Total Dissolved Solids, mg/l **	Report		Colorado River Basin Salinity Standards
Total Phosphorus, mg/l ***	Report		Control Regulations For Basins Listed In I.C.4.b

a/ 30-Day Average/7-Day Average c/ Daily Maximum
b/ Minimum-Maximum d/ 30-Day Average

* See Permit Rationale discussion, page 6
** Applicable to waters of the Colorado River basin only. See I.D.8. of the Permit
*** Applicable to waters listed in I.C.4.b) of the Permit

Additional Monitoring: *The Division reserves the right to request further monitoring of any pollutants outside the requirements of this permit to insure that the conditions of the general permit are met and/or to ensure that the antidegradation presumption is overcome by site specific reasons specified in Section 3.1.8(1)(c)(i)(ii)(iii) of The Basic Standards and Methodologies for Surface Water. If any of the additional monitoring indicates pollutants of concern that may be of an impact to the receiving waters, or may need limitations set, then the Division shall determine that an individual permit is required and reserves the right to require that the discharges cease until an individual permit is in effect. Additional monitoring shall be included with the Discharge Monitoring Report (DMR) and shall be subject to the permit's monitoring and reporting requirements.*

Additional monitoring for discharge point 001-002.

Parameter	Trigger Level	Frequency	Rationale
Total Mercury, ug/l	2	Once at beginning of draining pond, once halfway through, and once near end of pond draining.	Metals concentration in the sediments of the pond. Concern that metal concentrations in surface water will rise as sediments are disturbed.
Total Recoverable Iron, ug/l	1000		
Total Recoverable Zinc, ug/l	10		
Total Recoverable Chromium, ug/l	50		

<u>Results for additional monitoring parameters must be obtained as soon as possible after sampling. If trigger levels are reached or exceeded, permittee shall cease discharge and notify the Division immediately.</u>

The permittee is encouraged to read the general rationale for an understanding of how this permit was developed and to read the permit to see what requirements exist. Within the body of the permit itself, effluent limitations and monitoring requirements are specified in Parts I.B and I.C, Best Management Practices are addressed in Part I.F.5., and special notification requirements for effluent violations are addressed in Part II.A.2. and II.A.3. ***Organic Toxic Pollutants in the volatile fraction (VOC) shall be monitored and the data submitted in the manner described in I.C.4. of the permit. The first instance of VOC monitoring for this facility shall be <u>within 90 days of the effective date of this certification.</u>***

Salinity (TDS) monitoring of the discharge <u>will</u> be required.
Total Phosphorus monitoring of the discharge will not be required.

Aquatic life Whole Effluent Toxicity (WET) testing will not be required, *because of the short duration of the discharge.*

Although there is fuel storage in the project area, a Materials Containment Plan will not be required. However, diking should be performed as discussed in Best Management Practices Part I.F.5. of the permit.

<u>Certification</u>: Based on the above information, the gasoline cleanup facility is certified to discharge under the general permit for groundwater cleanup of gasoline, identified as permit number COG-310000. ***All correspondence relative to this facility should reference the specific facility number, COG-310084.***

The purpose of this amendment is to ; (1) change the mercury trigger level from 0.01 to 2 ug/l and (2) change the zinc trigger level from 2 to 10 ug/l. The original numbers were mistakenly inserted and the new numbers are the intended values. Also the permittee has requested that TPH analyses, which are routinely being done, be substituted for the Oil & Grease analyses required by the permit. Since the TPH analysis is more inclusive of petroleum hydrocarbons likely to be found, and the permittee recognizes the limit will remain 10 mg/l, the Division grants this request. The permittee has also requested that the methods used to analyze the samples are need only to provide detection levels that equal or are less than the permit limitations (or trigger levels as the case may be). This is satisfactory with the Division providing the method is EPA approved.

Tom Boyce
August 1, 1995

Effective 08/14/95. *Certified Letter No.* Z 416 968 879

A-3 Request for Termination of Permit to Discharge. March 21, 1997.

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RULISON
4-3
771038.02040000?

Department of Energy
Nevada Operations Office
P. O. Box 98518
Las Vegas, NV 89193-8518

MAR 21 1997

Darlene Casey, Administrative Assistant
Permits and Enforcement Section
Water Quality Control Division
Colorado Department of
Public Health and Environment
4300 Cherry Creek Dr. S.
Denver, CO 80222-1530

TERMINATION OF PERMIT TO DISCHARGE, DRILLING EFFLUENT POND PROJECT, PERMIT NUMBER COG-310084, GARFIELD COUNTY

Per this memorandum and the enclosed Water Quality Control Division Permit Termination Form, the DOE Nevada Operations Office (DOE/NV) is requesting termination of the subject permit.

The original intent of this discharge permit was to drain a drilling effluent pond at the Rulison Site to aid in the stabilization and removal of pond sediments during a cleanup effort conducted in the fall of 1995. Once the remaining sediment in the pond was determined to meet the state of Colorado's cleanup standards, workers regraded and compacted the bottom of the pond. A synthetic clay liner was installed and sod was placed on top of the liner to protect it from degradation.

As part of the pond remediation, DOE workers installed five groundwater monitoring wells to monitor groundwater quality and any possible impacts from residual diesel fuel and metals present in the pond sediments. These wells have been monitored on a quarterly basis since January 1996 and will continue to be sampled on a quarterly basis through 1997. After eight quarterly groundwater sampling events are evaluated, the frequency of groundwater monitoring may be reduced to semiannual events if no analytes are detected in amounts above regulatory limits. This groundwater monitoring is being conducted with the oversight of the Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division in Grand Junction, Colorado.

During each quarterly groundwater sampling event, stagnant groundwater is purged from the monitoring wells before samples are collected. The purged groundwater is discharged directly to the ground in the vicinity of the wells. The total volume of water discharged to the ground during a quarterly sampling event is approximately 50-100 gallons. This water does not reach the receiving stream identified in the permit, and the analytical data from the groundwater samples

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collected to date indicates that the quality of the discharged water is consistent with local background groundwater quality.

Based on the above information, DOE believes that the conditions for which the permit was issued no longer apply to the site, and that no discharges to the receiving stream are or will be occurring during the quarterly groundwater monitoring program.

If you have any questions concerning this matter, please contact me at (702) 295-0461.

Janet Appenzeller-Wing

Janet L. Appenzeller-Wing, Project Manager
Off-Sites Subproject

ERD:JAW

Enclosure:
As stated

cc w/o encl:
Dwain Watson, D.E., CDPHE, Denver, CO
Derald Lang, CDPHE, Denver, CO
Connie Moreno,CDPHE, Denver, CO
Paul J. Gretsky, IT, Las Vegas, NV

A-4 Termination of Permit to Discharge. November 18, 1997.

(This document has been reproduced as it was received by IT Corporation.)

STATE OF COLORADO

Roy Romer, Governor
Patti Shwayder, Executive Director

Dedicated to protecting and improving the health and environment of the people of Colorado

4300 Cherry Creek Dr. S.
Denver, Colorado 80246-1530
Phone (303) 692-2000
Located in Glendale, Colorado

Laboratory and Radiation Services Division
8100 Lowry Blvd.
Denver CO 80220-6928
(303) 692-3090

http://www.cdphe.state.co.us

Colorado Department of Public Health and Environment

ERD.971120.0002

November 18, 1997

Janet Appenzeller-Wing
U.S. Department of Energy
P.O. Box 98518
Las Vegas, Nevada 89193-8518

RE: Termination of Permit to Discharge
Drilling Effluent Pond Project
Permit No: COG-310084, Garfield County

Dear Ms. Appenzeller-Wing

As a follow-up to your request for termination of the permit referenced above, this letter is an official notice of termination of Colorado Discharge Permit Number COG-310084.

You have certified that all process water discharges have ceased, and all potential pollutant sources have been removed. It is our opinion that this sites does not require a discharge permit at this time. Should you begin operations in the future, and need to discharge process water, you will have to obtain new permit coverage for those discharges.

From this process a refund or additional fee may result and if so, you should receive notification within the next 30 days. Should you have questions on the fee, or should there be other questions on this action, please contact Darlene Casey at (303) 692-3599.

Sincerely,

Phil Hegeman

Phil Hegeman
Permits Unit Manager
Water Quality Protection Section
WATER QUALITY CONTROL DIVISION

cc: Permit Section, EPA, Mike Reed, Permits Team Leader (8P2-W-P)
Local Health Department
Dwain Watson, D.E., Technical Services Unit, WQCD
Leslie Simpson, Compliance Monitoring & Data Management Unit, WQCD
Permit File
Fee File

PH/dc

COLORADO DEPARTMENT OF HEALTH
Water Quality Control Division
Field Support Section

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NOV 12 1997
WATER QUALITY CONTROL

ACTION REQUEST FORM

DATE RECEIVED: ________ LOG NO: ________ BY: ________

TO: [redacted] Dubin Watson SECTION TRANSMITTAL DATE: 03-26-97

Thru: ________ ATTENTION: ________

FROM: Darlene Casey, Permits & Enforcement UNIT

SUBJECT: Termination - U.S. Dept. of Energy PERMIT NO: COG-310084

ACTION/INFORMATION REQUEST

PURPOSE FOR REQUEST: project completed DISCHARGE TO: Hayward Creek

FACILITY CONTACT: Janet appenzeller-Wing PHONE NO: 1-(702) 295-0461

LOCATION/DIRECTIONS AS APPLICABLE: approx. 8 miles South from town of Parachute Valley

Please respond by:* April 26, 1997. Attention: Darlene

* If unable to meet this response date, please notify this office ASAP.

cc: ________

RESPOSE TO ACTION/INFORMATION REQUEST

ATTENTION: ________ DATE: 10/21/97

OK to inactivate

cc: ________

D. Watson
SIGNATURE

Copy Distribution:

White - File Copy
Yellow - Field Support
Pink - Originator

Water Quality Control Division Permit Termination Form	Official Use Only	
	Date Sent	07/19/96
	Date Received	03-25-97
	Date to D.E.	03-28-97
	Date Rec'd from D.E.	11-17-97
	OK to Terminate	11/19/97

Facility Name: U.S. Department of Energy Vehicle Maintenance & Parking	Permit No.: COG-310084
Legal Contact: Janet Appenzeller-Wing	Legal Contact Phone No: (702) 295-0461
Facility Contact: same	Facility Contact Phone No.: (702) same
Facility Address: P.O. Box 98518	Legal Location: SW 1/4 of Sec. 25, T7S, R95W
Las Vegas, Nevada 89193-8518	County: Garfield

Direction: approx. 8 miles South from town of Parachute Valley, CO.

Please answer the following questions and sign the certification. If you have any questions regarding your facility and the information required, please contact your District Engineer, Dwain Watson at (303) 248-7156.

Purpose of Request project completed. Discharge was to Hayward Creek.

1. Is the construction complete? ☒ Yes ☐ No

   a. If not, is there any plan to complete construction in the future? ☐ Yes ☐ No

   b. If so, is there an estimate of when? ☐ Yes ☐ No

   Date for start-up ______________

2. If the facility is operational, is any process or other wastewater being produced? ☐ Yes ☒ No

   How much? ________ gpd

   a. If yes, is the water being treated? ☐ Yes ☐ No

   b. What form of treatment is utilized? Discuss sizes of unit processes and any chemical additions.

   c. Is any of the process or any other wastewater or water being discharged to waters of the state? (This includes groundwater in cases like unlined lagoons.) ☐ Yes ☐ No

      1. If yes, identify discharge point(s).

   d. Is the facility designed to be a non-discharging (evaporative) system. ☐ Yes ☐ No

3. Will the permittee continue to have a discharge point, such as pipe, conduit, unlined lagoon, etc? ☐ Yes ☒ No

4. Under what conditions could a discharge occur: Storm flow, change in operation, accidental spill, etc.

5. If this is a mining facility or operation, indicate whether any mine drainage exists. Discuss whether there has been a historical flow.

6. Is there a downstream water user, water supply intake, etc.? ☐ Yes ☒ No

   a. If yes, whom and where?

   b. Could they be impacted by a discharge or a spill of any pollutant on-site controllable under an SPCC Plan or other condition of a permit? ☐ Yes ☒ No

NOTE: THE FOLLOWING SHOULD BE KEPT IN MIND IF YOUR PERMIT IS TERMINATED:

1. The permittee will still be responsible and subject to any enforcement action for any discharge or spills into state waters. Should you operate your facility after your permit has been terminated and a discharge could occur, you must apply for a new permit no less than 180 days prior to the discharge. It is unlawful to discharge pollutants from a point source to state waters without a permit. Section 25-8-608 of the Water Quality Control Act provides for assessing civil penalties of up to $10,000 per day for unlawful discharges.

2. In general the continued existence of a discharge point will be the basis for not terminating a permit at the request of the permittee.

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein and based on my inquiry of those individuals immediately responsible for obtaining the information. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment. See 18 U.S.C. 1001 and 33 U.S.C. 1319.

Janet Zeppenfeld-Wing — 3/10/97

Authorized Representative — Date

10/17/97

Based upon my verification of the above information obtained during my site inspection, it is my recommendation that this permit be terminated.

[signature] — 10/21/97

District Engineer — Date

OK to inactivate ☒ Yes ☐ No

Appendix B

Letter of Agreement for Soil TPH Levels at the Rulison Pond Site

ERD.960617.0001

STATE OF COLORADO

Roy Romer, Governor
Patti Shwayder, Acting Executive Director

Dedicated to protecting and improving the health and environment of the people of Colorado

Grand Junction Regional Office
222 S. 6th Street, Room 232
Grand Junction, Colorado 81501-2768
Fax (970) 248-7198

Colorado Department of Public Health and Environment

June 7, 1996

Mr. Stephen A. Millington, Director
Environmental Restoration Division
Department of Energy Nevada Operations Office
P.O. Box 98518
Las Vegas, Nevada 89193-8518

Re: Rulison Pond Site

Dear Mr. Millington:

Mr. Kevin Leary of your office has asked me to write a letter confirming our variance agreement for soil TPH levels at the Rulison Pond Site in Rulison, Colorado. The Remediation Plan proposed attainment levels of 250 mg/kg TPH in soil in the excavated area. This target level was established by review of the Storage Tank Facility Owner/Operator Guidance Document (April 15, 1994) published by the Colorado Department of Public Health and Environment.

During the remediation, it became necessary to leave in place isolated areas with TPH concentrations in excess of the proposed attainment level. A variance of up to 1000 mg/kg TPH was agreed to by the Colorado Department of Public Health and Environment on October 17, 1995. This variance was to be supported by the Department of Energy with a risk assessment that would evaluate and document the areas and estimated volumes being left in place. Additionally, groundwater monitoring being conducted quarterly for a minimum of two years will be utilized to demonstrate the effectiveness of the remediation.

The risk assessment and documentation has not yet been received by our office. This information will be reviewed upon receipt.

If you require further information regarding the TPH variance please contact me at 970-248-7168.

Sincerely,

Donna Stoner

Donna Stoner, Environmental Specialist
Solid Waste Program
Hazardous Materials and
Waste Management Division

:ds

cc: Mr. Kevin Leary, DOE Nevada Operations Office
SW GAR RUL 1A
File

ACTION
INFO ERD
MGR ✓
OFFS
AMTS
AMNS
AMEM ✓

Appendix C

Analytical Results from Surface Ground Zero Investigation

C-1 Soil Boring Analytical Results

Table C-1
Surface Ground Zero Area Soil Boring Sample Analytical Results
(Page 1 of 3)

Sample #	RU-SB01-10		RU-SB01-10/06		RU-SB01-15		RU-SB02-15/12		RU-SB02-15		RU-SB02-20		RU-SB03-05		RU-SB03-05/10/15		RU-SB03-23		RU-SB04-05	
Date Collected	10/6/1995		10/6/1995		10/6/1995		10/6/1995		10/6/1995		10/6/1995		10/6/1995		10/6/1995		10/6/1995		10/6/1995	
		Q		Q		Q		Q		Q		Q		Q		Q		Q		Q
ORGANICS:	µg/kg		µg/kg		µg/kg		µg/kg		µg/kg		µg/kg		µg/kg		µg/kg		µg/kg		µg/kg	
Benzene	5	U	na		5	U	na		5	U	5	U	5	U	na		5	U	5	U
Toluene	5	U	na		5	U	na		5	U	5	U	5	U	na		5	U	5	U
Ethylbenzene	5	U	na		5	U	na		5	U	5	U	5	U	na		5	U	5	U
Total Xylene	5	U	na		5	U	na		5	U	5	U	5	U	na		5	U	5	U
TPH:	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
Diesel (EPA 8015)	na		140		66		110		na		150		na		66		68		na	
RADIATION:	pCi/g		pCi/g		pCi/g		pCi/g		pCi/g		pCi/g		pCi/g		pCi/g		pCi/g		pCi/g	
Gross Alpha	na		9.28±4.93	J	9.39±4.62	J	8.6±4.3	J	na		6.47	UJ	na		7.01	UJ	16.4±5.6	J	na	
Gross Beta	na		36.6±5.5		24.5±3.9		26.8±4.1		na		26.4±3.8		na		26.1±4.0		24.8±3.7		na	
Bismuth-214	na		nd		na		nd		na		na		na		0.79±0.4		na		na	
Cesium-137	na		0.33	U	na		0.15	U	na		na		na		0.18	U	na		na	
Potassium-40	na		19.3±5.3		na		22.7±4.5		na		na		na		22.6±4.6		na		na	
Lead-210	na		nd		na		nd		na		na		na		1.49±1.39		na		na	
Lead-212	na		1.34±0.46		na		1±0.41		na		na		na		1.14±0.2		na		na	
Lead-214	na		1.13±0.54		na		1.23±0.31		na		na		na		0.99±0.25		na		na	
Radium-224	na		nd		na		nd		na		na		na		nd		na		na	
Radium-226	na		nd		na		1.02±0.21		na		na		na		0.98±0.21		na		na	
Radium-228	na		nd		na		1.08±0.47		na		na		na		1.52±0.44		na		na	
Thorium-234	na		nd		na		nd		na		na		na		1.28±1.19		na		na	
Thallium-208	na		0.43±0.29		na		0.34±0.17		na		na		na		0.4±0.17		na		na	
Tritium	na		0.042	U	0.037	U	0.035	U	na		0.042	U	na		0.039	U	0.034	U	na	
RCRA METALS (TOTAL)	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
Arsenic	na		18.4		22.1		15.6		na		17.5		na		20.2		19		na	
Barium	na		246		247		197		na		194		na		214		186		na	
Cadmium	na		0.2	U	0.26	U	0.2	U	na		0.14	U	na		0.07	U	0.18	U	na	
Chromium	na		31.4		29.6		34.7		na		25.4		na		30		27.4		na	
Lead	na		17.9		14.1		10.9		na		12		na		14.1		12.1		na	
Mercury	na		0.05	U	0.05	U	0.05	U	na		0.05	U	na		0.05	U	0.05	U	na	
Selenium	na		0.53		0.48		0.5		na		0.28	U	na		0.84		0.53		na	
Silver	na		0.05	U	0.05	U	0.05	U	na		0.05	U	na		0.05	U	0.05	U	na	
RCRA METALS (TCLP)	mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L	
Arsenic	na		0.0377	UJ	0.0377	UJ	0.0377	UJ	na		0.0377	UJ	na		0.0377	UJ	0.0377	UJ	na	
Barium	na		1.02		1.4		1.4		na		1.28		na		1.23		1.37		na	
Cadmium	na		0.0034	U	0.0031	U	0.0038	U	na		0.0036	U	na		0.0034	U	0.0054	U	na	
Chromium	na		0.0037	U	0.0037	U	0.0037	U	na		0.0037	U	na		0.0037	U	0.0037	U	na	
Lead	na		0.0382	U	0.0382	U	0.0382	U	na		0.0382	U	na		0.0382	U	0.0382	U	na	
Mercury	na		0.0001	U	0.0001	U	0.0001	U	na		0.0001	U	na		0.0001	U	0.0001	U	na	
Selenium	na		0.0426	UJ	0.0426	UJ	0.0426	UJ	na		0.0426	UJ	na		0.0426	UJ	0.0426	UJ	na	
Silver	na		0.006	U	0.006	U	0.006	U	na		0.006	U	na		0.006	U	0.006	U	na	

Q = Data qualifier
U = Compound was analyzed for, but not detected above the specified limit
J = Reported value is estimated
D = Sample was diluted for analysis
mg/kg = milligrams per kilogram
µg/kg = micrograms per kilogram
mg/L = milligrams per liter
pCi/g = picoCuries per gram
na = not analyzed
nd = not detected

Table C-1
Surface Ground Zero Area Soil Boring Sample Analytical Results
(Page 2 of 3)

Sample #	RU-SB04-5/20		RU-SB04-23		RU-SB05-02		RU-SB05-17		RU-SB06-21/13		RU-SB06-21		RU-SB06-33		RU-SB07-18-1		RU-SB07-18-2	
Date Collected	10/6/1995		10/6/1995		10/6/1995		10/6/1995		10/7/1995		10/7/1995		10/7/1995		10/8/1995		10/8/1995	
		Q		Q		Q		Q		Q		Q		Q		Q		Q
ORGANICS:	**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**	
Benzene	na		5	U	5	U	5	U	na		20		5	U	5	U	5	U
Toluene	na		5	U	5	U	5	U	na		64		5	U	8.7		5.6	
Ethylbenzene	na		5	U	5	U	5.8		na		46		5	U	15		13	
Total Xylene	na		5	U	8.1		14		na		270		8.5		67		52	
TPH:	**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**	
Diesel (EPA 8015)	120		120		2400	D	100		2200	D	na		25	U	na		na	
RADIATION:	**pCi/g**		**pCi/g**		**pCi/g**		**pCi/g**		**pCi/g**		**pCi/g**		**pCi/g**		**pCi/g**		**pCi/g**	
Gross Alpha	9.02±4.44	J	9.56±4.33	J	12±5.5	J	11.4±4.9	J	6.36	UJ	na		6.71±3.71	J	na		na	
Gross Beta	23.8±3.8		27±4.1		22.4±4.1		24.5±3.7		27.5±4.4		na		16.5±2.9		na		na	
Bismuth-214	nd		na		0.82±0.35		na		nd		na		1.4±0.4		na		na	
Cesium-137	0.24	U	na		0.2	U	na		0.36	U	na		0.15	U	na		na	
Potassium-40	21.3±4.4		na		18.4±4.1		na		24.6±6.0		na		11.6±2.9		na		na	
Lead-210	nd		na		nd		na		nd		na		nd		na		na	
Lead-212	0.93±0.25		na		1.18±0.23		na		nd		na		0.99±0.20		na		na	
Lead-214	1.32±0.29		na		0.86±0.34		na		0.77±0.49		na		0.12±0.26		na		na	
Radium-224	nd		na		nd		na		nd		na		nd		na		na	
Radium-226	1.01±0.25		na		0.85±0.25		na		1.06±0.39		na		1.28±0.22		na		na	
Radium-228	nd		na		1.66±0.45		na		nd		na		nd		na		na	
Thorium-234	2.27±1.43		na		2.15±1.28		na		nd		na		nd		na		na	
Thallium-208	0.37±0.21		na		0.34±0.19		na		nd		na		0.34±0.16		na		na	
Tritium	0.030	U	0.034	U	0.06	U	0.038	U	0.98±0.11		na		0.034	U	na		na	
RCRA METALS (TOTAL)	**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**	
Arsenic	16.2		19.8		9		18.7		9.8		na		6.1		na		na	
Barium	245		244		3990		255		375		na		205		na		na	
Cadmium	0.23	U	0.27	U	0.29	U	0.19	U	0.05	U	na		0.03	U	na		na	
Chromium	30.5		29		79.3		25.6		112		na		14.4		na		na	
Lead	12		13.9		52.8		13.2		89.5		na		9.1		na		na	
Mercury	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	na		0.05	U	na		na	
Selenium	0.26	U	0.55		0.43		0.37	U	1.1		na		0.52	U	na		na	
Silver	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	na		0.05	U	na		na	
RCRA METALS (TCLP)	**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**	
Arsenic	0.0377	UJ	0.0377	UJ	0.0377	UJ	0.0377	UJ	0.0377	UJ	na		0.0377	UJ	na		na	
Barium	1.44		1.41		1.04		1.54		1.49		na		0.743		na		na	
Cadmium	0.004	U	0.0041	U	0.0032	U	0.0032	U	0.0037	U	na		0.0053	U	na		na	
Chromium	0.0037	U	0.0037	U	0.0135		0.0037	U	0.0797		na		0.0037	U	na		na	
Lead	0.0382	U	0.0382	U	0.0382	U	0.0382	U	0.0382	U	na		0.0382	U	na		na	
Mercury	0.0001	U	0.0001	U	0.0001	U	0.0001	U	0.0001	U	na		0.0001	U	na		na	
Selenium	0.0426	UJ	0.0426	UJ	0.0426	UJ	0.0426	UJ	0.0426	UJ	na		0.0426	UJ	na		na	
Silver	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	na		0.006	U	na		na	

Q = Data qualifier
U = Compound was analyzed f
J = Reported value is estimate
D = Sample was diluted for ana
mg/kg = milligrams per kilogram
µg/kg = micrograms per kilogra
mg/L = milligrams per liter
pCi/g = picoCuries per gram
na = not analyzed
nd = not detected

Table C-1
Surface Ground Zero Area Soil Boring Sample Analytical Results
(Page 3 of 3)

Sample #	RU-SB07-18/22-01		RU-SB07-18/22-02		RU-SB07-23		RU-SB07-30		RU-SB08-05		RU-SB08-05/10		RU-SB08-31	
Date Collected	10/8/1995		10/8/1995		10/8/1995		10/8/1995		10/8/1995		10/8/1995		10/8/1995	
		Q		**Q**		**Q**		**Q**		**Q**		**Q**		**Q**
ORGANICS:	**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**	
Benzene	na		na		5	U	5	U	290		na		5	U
Toluene	na		na		27		5	U	120	U	na		5	U
Ethylbenzene	na		na		41		5	U	1400		na		15	
Total Xylene	na		na		210		5	U	23000		na		220	
TPH:	**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**	
Diesel (EPA 8015)	4700	D	3500	D	na		24	U	na		2100	D	24	U
RADIATION:	**pCi/g**		**pCi/g**		**pCi/g**		**pCi/g**		**pCi/g**		**pCi/g**		**pCi/g**	
Gross Alpha	6.64	UJ	11.5±5.4	J	na		9.72±4.44	J	na		7.68	UJ	10.4±5.1	J
Gross Beta	26.3±4.6		23.3±4.0		na		21.7±3.5		na		29.8±4.7		18.3±3.4	
Bismuth-214	1.48±0.40		1.01±0.30		na		na		na		1.33±0.39		na	
Cesium-137	0.19	U	0.21	U	na		na		na		0.2	U	na	
Potassium-40	21±4.3		16.6±3.6		na		na		na		23.1±4.7		na	
Lead-210	nd		nd		na		na		na		2.17±1.82		na	
Lead-212	1.06±0.19		1.03±0.26		na		na		na		1.39±0.26		na	
Lead-214	0.89±0.27		0.79±0.27		na		na		na		0.88±0.32		na	
Radium-224	2.04±1.61		3.6±2.3		na		na		na		3.14±2.53		na	
Radium-226	1.12±0.23		0.9±0.2		na		na		na		1.07±0.25		na	
Radium-228	1.02±0.56		nd		na		na		na		1.55±0.52		na	
Thorium-234	nd		nd		na		na		na		nd		na	
Thallium-208	0.43±0.18		0.37±0.13		na		na		na		0.56±0.27		na	
Tritium	0.41±0.05		0.38±0.05		na		0.038	U	na		0.024±0.014		0.062±0.015	
RCRA METALS (TOTAL)	**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**	
Arsenic	8.9		7.5		na		11.7		na		13.4		5.9	
Barium	1450		670		na		339		na		298		113	
Cadmium	0.12	U	0.37		na		0.03	U	na		0.03	U	0.03	U
Chromium	61.5		44		na		17.8		na		35.1		13.2	
Lead	119		89		na		12		na		17.5		6.7	
Mercury	0.05	U	0.05	U	na		0.05	U	na		0.05	U	0.05	U
Selenium	0.71	U	0.52	U	na		0.98	U	na		0.53	U	0.47	U
Silver	0.05	U	0.05	U	na		0.05	U	na		0.05	U	0.05	U
RCRA METALS (TCLP)	**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**	
Arsenic	0.0377	UJ	0.0377	UJ	na		0.0377	UJ	na		0.0377	UJ	0.0377	UJ
Barium	1.43		1.51		na		0.889		na		1.75		0.757	
Cadmium	0.0068	U	0.0056	U	na		0.0049	U	na		0.0035	U	0.0046	U
Chromium	0.0146		0.0155		na		0.0037	U	na		0.0037	U	0.0037	U
Lead	0.0813		0.056		na		0.0382	U	na		0.0382	U	0.0382	U
Mercury	0.0001	U	0.0001	U	na		0.0001	U	na		0.0001	U	0.0001	U
Selenium	0.0426	UJ	0.0426	UJ	na		0.0426	UJ	na		0.0426	UJ	0.0426	UJ
Silver	0.006	U	0.006	U	na		0.006	U	na		0.006	U	0.006	U

Q = Data qualifier
U = Compound was analyzed f
J = Reported value is estimate
D = Sample was diluted for ana
mg/kg = milligrams per kilogram
µg/kg = micrograms per kilogra
mg/L = milligrams per liter
pCi/g = picoCuries per gram
na = not analyzed
nd = not detected

C-2 Stream Sample Analytical Results

Table C-2
Surface Ground Zero Area Stream Sample Analytical Results

Sample #	RU-SED-11/15-01		RU-STR-11/15-01		RU-STRB-11/16-01	
Date Collected	11/15/95		11/15/95		11/16/95	
Sample Location	Stream Bed		Stream water		Stream Bank	
		Q		Q		Q
TPH (Method 8015)	**mg/kg**		**mg/L**		**mg/kg**	
Diesel	25	U	0.5	U	24	U
Waste Oil	25	U	0.5	U	24	U
Total RCRA Metals	**mg/kg**		**ug/L**		**mg/kg**	
Arsenic	15.7		3.9	B	13.9	
Barium	164		43.6	B	217	
Cadmium	0.33	B	2.3	U	0.44	B
Chromium	22.4		3.7	U	27.8	
Lead	10.5		0.80	U	12.5	
Selenium	0.26	U	2.6	U	0.26	U
Silver	0.60	U	6.0	U	0.60	U
Mercury	0.05	U	0.10	U	0.05	U

Notes:
Q = Laboratory assigned data qualifier
U = Compound was analyzed but not detected above the specified limit.
B = Result is above the Instrument Detection Limit but below the Contract Required Detection Limit.
mg/L = milligrams per liter; ug/L = micrograms per liter; mg/kg = milligrams per kilogram

C-3 Surface Ground Zero Radiological Sample Analytical Results

Table C-3
Surface Ground Zero Area Radiological Sample Analytical Results

Sample #	RU-SZ-01	RU-SF-01	RU-SF-03	RU-SF-04	RU-SF-05	RU-SF-06	RU-SF-07	RU-SF-08	RU-SF-09
Date Collected	11/4/1995	11/4/1995	11/4/1995	11/4/1995	11/8/1995	11/8/1995	11/4/1995	11/4/1995	11/4/1995
RADIATION:	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g
Gross Alpha	12.5	15.2	6.40	13.3	6.74	9.91	17.2	8.22	10.8
Gross Beta	28.4	31.0	24.8	31.2	31.0	29.4	43.4	36.3	34.5
Cesium-137	ND	ND	ND	ND	ND	ND	ND	ND	ND
Potassium-40	23.2	28.2	17.9	27.5	27.2	23.8	41.1	28.7	27.8
Thallium-208	0.34	0.52	0.37	0.43	0.51	0.44	0.51	0.52	0.75
Bismuth-212	NA	NA	NA	NA	NA	NA	NA	1.30	NA
Lead-212	1.14	1.58	0.96	1.39	1.43	1.37	1.64	1.41	1.80
Bismuth-214	NA	NA	NA	1.18	1.27	1.26	1.56	1.27	1.20
Lead-214	1.24	1.22	0.97	0.93	1.42	1.19	1.39	1.35	1.23
Radium-226	1.01	1.05	0.98	0.97	1.36	1.24	1.45	1.36	1.22
Radium-228	NA	1.38	NA	1.06	NA	1.66	1.43	1.26	NA
Tritium	-0.006	-0.008	0.0007	-0.020	-0.006	-0.017	-0.010	-0.002	-0.002
Carbon-14	-0.0112	0.0728	-0.0186	0.0442	0.00269	0.0273	0.0105	0.0749	-0.00539

Notes:

NA = Sample not analyzed for indicated compound.

ND = Analyte not detected above method detection limit.

pCi/g = Picocuries per gram

Appendix D

Variances from Approved Work Plans

Table D-1
Corrective Action Plan Variances
(Page 1 of 4)

Variance Number	Document Section	Original Technical Approach	Actual Technical Activity	Rationale for Change
1	CAP, 3.2 Para. 1	Use of open area adjacent to the pond for staging...	The open area was not utilized for stabilizing of sediment.	Sediment was stabilized and stored in the pond then stockpiled on a 20 mil thick polyethylene plastic sheet over the settling basin at the east corner of the pond prior to transportation off location.
2	CAP, 3.2 Para. 2	Stored materials include stabilizer, 3/4-in. stone...	The staging area was not used for storage of a water treatment system because it was not utilized during the remediation activity. Kiln dust, used to stabilize the sediment, was stored in the pond prior to mixing.	Groundwater infiltrating into the dewatering trench during sediment stabilization and removal was below permitted discharge limits and did not require treatment. It was more efficient to store kiln dust in the pond.
3	CAP, 3.2 Para. 4	Preliminary drying of the sediments will occur...	No drying of the sediment or capturing of excess water from the sediment was required.	Excess water was absorbed by the kiln dust used to stabilize the sediment.
4	CAP, 3.3 Para. 1	Fish and salamanders will be removed from the pond...	Twenty-five fish were removed by capturing them with barbless hooks and then transporting them to a nearby beaver pond. No salamanders were observed.	No effective method was found to stun the fish using either ichthycides or electricity without stirring up contaminated sediments from the pond bottom, resulting in water disposal problems.
5	CAP, 3.4 Para. 1	Drainage of the pond will be required for sediment removal...	Gasoline powered pumps were used. Discharge hoses were placed in the riprap-lined pond spillway that discharged into the nearby stream ("Hayward Creek").	Gasoline powered pumps were more readily available than diesel powered pumps. Water was discharged to the vegetated riprap to minimize stream erosion and remove suspended material.
6	CAP, 3.4 Para. 2	Prior to pond drainage, the inlet to the pond will be blocked...	The spring flow was diverted from flowing into the pond by damming the inlet channel to the pond and draining collected water into the nearby stream through a 4-inch flexible pipe.	This engineering solution was deemed in the field to be simpler and more cost effective than the original plan.
7	CAP, 3.4 Para. 5	After removing the majority of the pond water...	Water remaining in the pond after initial pond dewatering was stabilized with kiln dust.	Stabilizing the water with the sediment was cheaper and more practical than moving in Baker tanks and installing a water treatment system.
8	CAP, 3.4 Para. 5	After removing the majority of the pond water...	No produced water was pumped to Baker tanks for treatment or disposal.	See above rationale.

Table D-1
Corrective Action Plan Variances

Variance Number	Document Section	Original Technical Approach	Actual Technical Activity	Rationale for Change
9	CAP, 3.4 Para. 6	If the water in the Baker tanks does not pass...	No water treatment system was utilized.	See above rationale.
10	CAP, 3.4 Para. 8	During pond drainage activities...	The groundwater levels were not monitored.	The sump excavated into the pond bottom adequately handled infiltrating groundwater, so the well points proposed in the CAP were not needed.
11	CAP, 3.4 Para. 8	The hydraulic characteristics of soils...	The hydraulic characteristics were not determined prior to draining the pond.	The sump excavated into the pond bottom adequately handled infiltrating groundwater, so the well points proposed in the CAP were not needed.
12	CAP, 3.4 Para. 8	If construction dewatering is determined to be...	A dewatering trench was installed along the southwest (upgradient) pond wall after the sediment was stabilized. The trench was installed to intercept groundwater infiltrating into the pond from upgradient.	Because it became necessary to remove soil from below the water table, the dewatering trench was deemed the best and most cost-effective engineering solution to control groundwater infiltration.
13	CAP, 3.5 Para. 3	Sediment drying would best be accomplished...	Sediment drying activity with associated water handling and treatment was not performed. The sediment was stabilized in the pond, using kiln dust.	Stabilizing all of the material was better and did not require much more stabilizer than would be needed to stabilize the "dewatered" sediment, and it would require less time.
14	CAP, 3.5 Para. 4	The pond will be covered...	The pond was not covered during precipitation events.	Covering the pond with plastic sheeting was impractical and would have resulted in the generation of large quantities of contaminated plastic.
15	CAP, 3.6 Para. 3	The sediment will be blended with a pug mill...	A pug mill was not used to blend the sediments. The sediments were mixed in place using two excavators.	This engineering solution was deemed in the field to be simpler, faster, and more cost-effective than the original plan.
16	CAP, 3.6 Para. 3	Following sampling, the resulting stabilized mixture...	The stabilized sediment was stored in the pond itself or stockpiled over the settling basin adjacent to the east corner of the pond for approximately 48 hours prior to transport off site for disposal. This time period was based on receiving laboratory analyses confirming stabilization of the contaminants of concern.	This change in plan was by State of Colorado Waste Management Division as acceptance criteria for classification of the stabilized sediment as solid waste. It was put into place after the CAP was written.

Table D-1
Corrective Action Plan Variances
(Page 3 of 4)

Variance Number	Document Section	Original Technical Approach	Actual Technical Activity	Rationale for Change
17	CAP, 3.6 Para. 4	Vendors who market proprietary stabilizers...	No bench top studies were conducted. Cement and kiln dust were tested in the field. Kiln dust was selected for use in stabilizing the sediment.	The kiln dust was as effective as cement in stabilizing the sediment and less costly than cement.
18	CAP, 3.6 Para. 5	The bench test will also determine how chromium...	A bench top partition test was not performed on the sediment and water.	The kiln dust bound the water in the sediment. There was no partition of the sediment and water.
19	CAP, 3.7 Para. 1	Following removal of the sediment, confirmatory...	The TPH cleanup standard was increased from 250 milligrams per kilogram to 1,000 milligrams per kilogram.	Verbal authorization was received from the State of Colorado on October 12, 1995 to raise the cleanup level to 1,000 milligrams per kilogram in the pond sediments. State of Colorado correspondence documenting the verbal authorization was received by DOE on June 7, 1996 (see Appendix E).
20	CAP, 3.8 Para. 2	Following the installation of the pond liner...	Spring flow into the pond was not restored at the conclusion of remediation activities in November 1995.	The land owner did not have ownership of the water rights to the spring.
21	CAP, 3.8 Para. 3	A critical aspect of pond restoration...	The pond liner was covered with Kentucky bluegrass sod. The pond was not restocked with trout.	Natural vegetation could not be reestablished, nor could the trout be restocked because the pond was not refilled with water.
22	CAP, 3.9 Para. 3	Eight groundwater monitoring wells are planned...	Seven groundwater monitoring wells were installed at the Rulison site.	One of two planned hydraulically upgradient monitoring wells was eliminated. One well was enough to provide the necessary background groundwater quality information.
23	CAP, 3.9 Para. 4	Two methods of monitoring well installation...	The wells were not installed by a State of Colorado-licensed well driller.	It is not necessary for environmental monitoring wells to be installed in the State of Colorado by a licensed well driller per Colorado 2CCR-402-2, Paragraph 7.1.
24	CAP, 3.9 Para. 4	The wells downgradient of the pond...	The wells were dug using shovels and a pry bar.	The soil was too rocky to hand auger or to use a portable motorized auger.

Table D-1
Corrective Action Plan Variances
(Page 4 of 4)

Variance Number	Document Section	Original Technical Approach	Actual Technical Activity	Rationale for Change
25	CAP, 3.9 Para. 5	The upgradient wells will be constructed...	Three of the wells located down-gradient of the drilling effluent pond and one well located down-gradient of emplacement hole R-E were constructed of 4-inch Schedule 40 PVC. The well located upgradient of the drilling effluent pond, one well located downgradient of the drilling effluent pond and one well down- gradient of emplacement hole R-E were constructed of 5-inch Schedule 40 PVC.	The well designs were changed to reflect revised objectives for the well and to accommodate available testing equipment.
26	CAP, 3.9 Para. 7	The filter pack will consist of washed and graded...	A 16/32-sized filter pack instead of 20/40 was installed in the groundwater monitoring wells.	The slot size opening for the PVC well screens was 0.02 inch. The filter pack was changed to be compatible with this slot size opening.

PVC = Polyvinyl chloride

Table D-2
Verification Sampling and Analysis Plan Variances
(Page 1 of 2)

Variance Number	Document Section	Original Technical Approach	Actual Technical Activity	Rationale for Change
1	VSAP, 1.3 Para. 1 Sen. 5	Third, it is anticipated that as water drainage from the pond...	Water remaining in the pond after pond drainage was mixed with kiln dust stabilizer and taken to the landfill for disposal with the other stabilized sediment.	This engineering solution was deemed in the field to be simpler and more cost-effective than the original plan.
2	VSAP, 1.3 Para. 2 Bullet 6	Water samples will be analyzed for whole effluent toxicity...	This analyses performed on water drained from the pond were organic toxic pollutants (OTP), total suspended solids (TSS), total dissolved solids (TDS), pH, total petroleum hydrocarbons (TPH), benzene, toluene ethyl benzene xylene (BTEX), potentially dissolved lead (Pb), total mercury (Hg), & total recoverable chromium (Cr), iron (Fe) & zinc (Zn).	All the analyses except for whole effluent toxicity (WET) were specified in the State of Colorado discharge permit. Because there were trout living in the pond, the State determined that WET analysis was not needed.
3	VSAP, 1.3 Para. 3 Bullet 1	The sediment will be mixed with a pug mill...	A pug mill was not used to mix the sediments. The sediments were mixed in place in the pond using two excavators.	This engineering solution was deemed in the field to be simpler and more cost-effective than the original plan.
4	VSAP, 1.3 Para. 3 Bullet 3	Stabilized sediment will be analyzed for...	The laboratory analyses performed on the stabilized sediment were Toxicity Characteristic Leaching Procedure (TCLP) Chromium, TPH, and TCLP Benzene. Paint filter and pH tests were performed on the stabilized sediment in the field.	The paint filter test was required by the State of Colorado for disposal purposes. The pH tests were performed to ensure that the pH of the stabilized sediment was high enough to render metals immobile and to meet landfill requirements.
5	VSAP, 1.3 Para. 5 Bullet 4	Soil samples will be analyzed for total TCLP RCRA Metals...	Soil samples were analyzed for TCLP RCRA metals, TPH and TCLP benzene.	The instructions used by field sampling personnel during verification sampling specified that samples were to be analyzed for TCLP benzene and TCLP metals.
6	VSAP, 1.3 Para. 4	The proposed approach for sampling water that may...	Potentially contaminated water was not pumped to Baker tanks; therefore, no sampling of this water occurred. All potentially contaminated water was mixed with kiln dust stabilizer and analyzed as stabilized sediment.	This engineering solution was deemed in the field to be simpler and more cost-effective than the original plan.
7	VSAP, 5.2 Para. 1 Bullet 1	Sample will be collected from the pond prior to initiating discharge...	No samples were collected and analyzed for Whole Effluent Toxicity.	See Technical Change number 2 above.

Table D-2
Verification Sampling and Analysis Plan Variances

Variance Number	Document Section	Original Technical Approach	Actual Technical Activity	Rationale for Change
8	VSAP, 5.2 Para. 1 Bullet 2	One sample will be collected at the beginning...	The analyses performed on the water sample collected at the beginning of pond drainage activities were TSS, TDS, pH, TPH, BTEX, Potentially Dissolved Lead, Total Hg, and Total Recoverable Cr, Fe and Zn.	These analyses were stipulated by the State of Colorado as part of the site water discharge permit, except for OTC. The permit was not available when the VSAP was prepared.
9	VSAP, 5.2 Para. 1 Bullet 3	At midpoint of draining the pond, one sample will be ...	The analyses performed on the water sample collected at the midpoint of pond drainage activities were OTC, TSS, TDS, pH, TPH, BTEX, Potentially Dissolved Lead, Total Hg, and Total Recoverable Cr, Fe and Zn.	See above rationale.
10	VSAP, 5.2 Para. 1 Bullet 4	At the endpoint of pond drainage activity...	The analyses performed on the water sample collected at the end of pond drainage activities were TSS, TDS, pH, TPH, BTEX, Potentially Dissolved Lead, Total Hg, and Total Recoverable Cr, Fe and Zn.	See above rationale.
11	VSAP, 5.3 Para. 1 Sen. 3	Approximately 3,000 cubic yards (yd^3)....	The actual volume of stabilized sediment removed from the pond was 24,443 yd^3.	Hydrocarbons migrated into the wall of the dam and further than expected beneath the drilling mud into the floor of the pond.
12	VSAP, 5.3 Para. 1 Sen.	Ten samples of the stabilized sediment...	The actual number of stabilized sediment samples collected was 82, corresponding to 1 sample for every 300 yd^3 of stabilized sediment.	See above rationale.
13	VSAP, 5.4 Para. 1	The goal of this sampling task is to verify...	No treated pond water samples were analyzed.	All excess pond water was mixed with kiln dust stabilizer and transported to the landfill. No analyses were necessary.
14	VSAP, 5.5 Para. 7	The sample grid is calculated from the following...	The number of verification soil samples collected from the floor of the pond was increased from 37 to 55. Six test holes were dug on the walls of the pond, with three samples collected from each pit.	The number of samples was increased, in response to a request from a representative of the Colorado Department of Health, Solid Waste Management Division. The test pits were added when it was discovered that hydrocarbons had migrated into the walls of the pond.
15	VSAP, 5.10 Para. 1	The analytical laboratory will supply sample containers...	The sample containers were purchased separately.	The DOE-specified analytical laboratory, Rust GeoTech, did not supply sample containers for this project.

Table D-3
Long Term Groundwater Monitoring Plan Variances
(Page 1 of 2)

Variance Number	Document Section	Original Technical Approach	Actual Technical Activity	Rationale for Change
1	LTGMP 1.0 Para. 1 Sec. 1.4 Para. 1 Sen. 4 Sec. 2.1.1 Para. 1 Sac. 5.0 Para. 1	The purpose of this groundwater...	A total of seven monitoring wells were installed during the remediation of the Rulison Drilling Effluent Pond Site.	Two wells upgradient of the drilling effluent were to be incorporated into a well point system. Because of the low permeability of the aquifer material, the well point system was subsequently deemed not feasible.
2	LTGMP 1.4 Para. 1 Sen. 2	Based on the current knowledge...	Sediment was stabilized, in-place, in the floor of the pond	This engineering solution was deemed in the field to be simpler and more cost-effective than the original plan.
3	LTGMP, 2.2 Para. 1	The downgradient wells, because of their location...	Four borings downgradient of the drilling effluent pond were dug by hand, and three were sampled. Monitoring wells were installed in three of the hand-dug wells. One hand-dug well was replaced by a drilled well.	Only one of the well locations was readily accessible to the drill rig.
4	LTGMP, 2.2 Para. 3	The upgradient wells will be constructed of 4-inch PVC...	Three downgradient wells were constructed of 4-inch, Schedule 40 PVC. One upgradient well and one downgradient well were constructed of 5-inch, Schedule 40 PVC.	The well designs were changed to reflect revised objectives for the well and to accommodate available testing equipment.
5	LTGMP, 2.2 Para. 4	Depending on the depth to water encountered...	Centralizers were not installed in two monitoring wells	Centralizers are not required for wells with an annular space less than 2.5 inches (State of Colorado, Water Well Construction Rules, 2-CCR 402-2, Section 10.4.2)
6	LTGMP, 2.2 Para. 5	Because of their location, the 2-inch wells will use...	The 2-inch wells were replaced with 4 and 5-inch wells.	The well designs were changed to reflect revised objectives for the well and to accommodate available testing equipment.
7	LTGMP, 2.2 Para. 5	A filter pack size of 20/40 is expected to be appropriate...	A 16/32-sized filter pack instead of 20/40 was installed in the groundwater monitoring wells.	This change was made based on information regarding the grain-size distribution of the aquifer matrix that was not available when the CAP was prepared.

Table D-3
Long Term Groundwater Monitoring Plan Variances
(Page 2 of 2)

Variance Number	Document Section	Original Technical Approach	Actual Technical Activity	Rationale for Change
8	LTGMP, 2.4 Para. 1	Drill cuttings, waste materials from soil samples...	Uncontaminated drill cuttings from wells drilled adjacent to the drilling effluent pond were placed onto plastic sheeting instead of into 55-gallon barrels.	This change was proposed by DOE and approved by the State of Colorado regulators after the LTGMP was prepared. Following completion of each drill hole, the cuttings were placed into drums.
9	LTGMP, 3.0 Para. 3.3	Groundwater Monitoring Methodology	Prior to discharging groundwater during the pumping test, a quick turnaround groundwater sample was analyzed for the discharge parameters specified in the State of Colorado groundwater discharge permit.	Although the permit did not address this activity, the groundwater sample was collected and analyzed to verify that no contaminated water was discharged to the nearby stream during the pumping test. Because of low production rates, one to less than three gallons per minute, all water produced during pumping was applied to the land surface.
10	LGTMP, 7.1.2 Para. 1	Additional sample volume will be collected...	An MS/MSD sample was not collected during the first round groundwater sampling event in August 1995.	The plan stipulates that the MS/MSD sample be collected from an hydraulically upgradient well. The upgradient well had not been installed at the time of this sampling event.
11	LTGMP, 7.1.3 Para. 1	To assess the effectiveness of the purging...	Distilled water was used to collect equipment rinsate samples.	Deionized water was not available at this site.
12	LTGMP, 7.1.4 Para. 1	Trip blank samples will be used during...	Trip blanks were prepared in the field laboratory.	The analytical laboratory, Rust GeoTech, did not supply trip blank samples for this project.

Table D-4
Quality Assurance Project Plan Variances
(Page 1 of 1)

Variance Number	Document Section	Original Technical Approach	Actual Technical Activity	Rationale for Change
1	QAPP C 5.3 Table 5-2	BTEX by method 8020A TPH by method 8015A	BTEX by method 8260 TPH by method 418.1	The analytical laboratory Rust GeoTech did not have the capability to perform methods 8020A or 8015A, as prescribed in the QAPP.
2	QAPP C 5.5.2.1 Para. 1	Tier I review is essentially a completeness review...	A partial Tier I review was conducted in the field.	It was deemed more cost-effective to have qualified personnel from the office review the data and notify field personnel of any discrepancies.
3	QAPP C 5.5.2.2 Para. 1	Tier II review shall include a review...	A partial Tier II review was conducted in the field.	See above rationale.

Table D-5
Nonconformances
(Page 1 of 1)

Nonconformance Number	Document Section	Nonconformance	Cause
1	QAPP, 5.2.1 Para. 2	Chain of custody #42176 dated 8/7/95 was not signed over to Rust GeoTech laboratory by a sample team member. However, a sample team member was in continuous possession of the samples and was present during transfer of custody.	Oversight by the personnel delivering the samples. A sampling team member was present but the other person delivering the samples signed the form.
2&3	LTGMP, 2.2 Para. 4	Centralizers were not installed in monitoring wells RU-6A or RU-2.	The driller was having trouble installing the well casing with the centralizers because of the small annular space and since centralizers are not required for wells with an annular space less than 2.5 inches (State of Colorado, Water Well Construction Rules, 2-CCR 402-2, Section 10.4.2) the casing was installed without the centralizers.
4	VSAP, 5.5 Para. 7	One verification sample designated as sample location # 39 was not collected from the floor of the pond.	The location identified for this sample was under water so sampling personnel could not reach it.
5	VSAP, 5.7 Para. 1	Total metals analyses were not performed on verification soil samples collected in the pond as prescribed in the work plan.	TCLP metals analyses were performed instead because that is what the State of Colorado uses to determine if soils need to be cleaned up.
6	QAPP, 1.0 Table 1-2	Duplicate samples were not collected every day that samples were collected as prescribed in the work plan.	Duplicate samples were not collected every day of sampling because only a small number of samples were collected on most days and this would have resulted in an inordinately large number of duplicate samples and analytical costs.

Appendix E

Pond Cleanup Verification Results

APPENDIX F
POND CLEANUP VERIFICATION ANALYTICAL RESULTS

IT Corp ID#	**RU-VSS-01**		**RU-VSS-01-1**		**RU-VSS-01-2**		**RU-VSS-02**		**RU-VSS-02-1**		**RU-VSS-03**		**RU-VSS-03-1**		**RU-VSS-04**		**RU-VSS-04-1**	
Date Collected	9/7/1995		9/9/1995		10/13/95		9/7/1995		9/9/1995		8/31/1995		9/9/1995		8/31/1995		9/9/1995	
Sample Location	Pond Floor		Pond Floor		Pond Floor		Pond Floor		Pond Floor		Pond Floor		Pond Floor		Pond Floor		Pond Floor	
	Conc.	**Q**	**Conc.**	**Q**	**Conc.**	**Q**	**Conc.**	**Q**	**Conc.**	**Q**	**Conc.**	**Q**	**Conc.**	**Q**	**Conc.**	**Q**	**Conc.**	**Q**
TPH:	**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**	
Nonspecific	na		1,021	J	na		na		700	J	na		70	J	na		685	J
Diesel	1,600		na		22		1,700		na		na		na		na		na	
Waste Oil	na		na		na		na		na		na		na		na		na	
METALS: (TCLP)	**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**	
Silver	na		na		na		na		na		na		na		na		na	
Arsenic	na		na		na		na		na		na		na		na		na	
Barium	na		na		na		na		na		na		na		na		na	
Cadmium	na		na		na		na		na		na		na		na		na	
Chromium	na		na		na		na		na		na		na		na		na	
Lead	na		na		na		na		na		na		na		na		na	
Selenium	na		na		na		na		na		na		na		na		na	
Mercury	na		na		na		na		na		na		na		na		na	
ORGANICS: (TCLP)	**µg/L**		**µg/L**		**µg/L**		**µg/L**		**µg/L**		**µg/L**		**µg/L**		**µg/L**		**µg/L**	
Chloromethane	50	U	na		na		50	U	na		50	U	na		50	U	na	
Vinyl Chloride	10	U	na		na		10	U	na		10	U	na		10	U	na	
Bromomethane	50	U	na		na		50	U	na		50	U	na		50	U	na	
Chloroethane	50	U	na		na		50	U	na		50	U	na		50	U	na	
Acrolein	120	U	na		na		120	U	na		120	U	na		120	U	na	
Acrylonitrile	120	U	na		na		120	U	na		120	U	na		120	U	na	
Methylene Chloride	50	U	na		na		50	U	na		50	U	na		50	U	na	
1,1-Dichloroethene	25	U	na		na		25	U	na		25	U	na		25	U	na	
trans-1,2-Dichloroethene	25	U	na		na		25	U	na		25	U	na		25	U	na	
1,1-Dichloroethane	25	U	na		na		25	U	na		25	U	na		25	U	na	
Chloroform	5	J	na		na		10	J	na		10	J	na		10	J	na	
1,2-Dichloroethane	25	U	na		na		25	U	na		25	U	na		25	U	na	
1,1,1-Trichloroethane	25	U	na		na		25	U	na		25	U	na		25	U	na	
Carbon Tetrachloride	25	U	na		na		25	U	na		25	U	na		25	U	na	
Trichloroethene	25	U	na		na		25	U	na		25	U	na		25	U	na	
1,2-Dichloropropane	25	U	na		na		25	U	na		25	U	na		25	U	na	
Benzene	5	U	na		25	U	5	U	na		5	U	na		5	U	na	
2-Chloroethylvinyl ether	50	U	na		na		50	U	na		50	U	na		50	U	na	
Bromodichloromethane	25	U	na		na		25	U	na		25	U	na		25	U	na	
trans-1,3-Dichloropropene	25	U	na		na		25	U	na		25	U	na		25	U	na	
cis-1,3-Dichloropropene	25	U	na		na		25	U	na		25	U	na		25	U	na	
1,1,2-Trichloroethane	25	U	na		na		25	U	na		25	U	na		25	U	na	
Chlorodibromomethane	25	U	na		na		25	U	na		25	U	na		25	U	na	
Toluene	25	U	na		na		25	U	na		25	U	na		25	U	na	
Tetrachloroethene	25	U	na		na		25	U	na		25	U	na		25	U	na	
Chlorobenzene	25	U	na		na		25	U	na		25	U	na		25	U	na	
Ethylbenzene	25	U	na		na		25	U	na		25	U	na		25	U	na	
Total Xylene	25	U	na		na		25	U	na		25	U	na		25	U	na	
Bromoform	25	U	na		na		25	U	na		25	U	na		25	U	na	
1,1,2,2-Tetrachloroethane	25	U	na		na		25	U	na		25	U	na		25	U	na	

APPENDIX F
POND CLEANUP VERIFICATION ANALYTICAL RESULTS

IT Corp ID#	RU-VSS-04-2		RU-VSS-05		RU-VSS-05-1		RU-VSS-05-2		RU-VSS-06		RU-VSS-06-1		RU-VSS-07-1		RU-VSS-08	
Date Collected	10/13/95		8/31/1995		9/9/1995		10/13/95		8/31/1995		9/9/1995		9/9/1995		9/7/1995	
Sample Location	Pond Floor		Pond Floor		Pond Floor		Pond Floor		Pond Floor		Pond Floor		Pond Floor		Pond Floor	
	Conc.	**Q**	**Conc.**	**Q**	**Conc.**	**Q**	**Conc.**	**Q**	**Conc.**	**Q**	**Conc.**	**Q**	**Conc.**	**Q**	**Conc.**	**Q**
TPH:	**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**	
Nonspecific	na		na		590	J	na		na		138	J	310	J	na	
Diesel	160		na		na		33		na		na		na		260	
Waste Oil	na		na		na		na		na		na		na		na	
METALS: (TCLP)	**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**	
Silver	na		na		0.0044	U	0.50	UJ	na		na		na		0.0044	U
Arsenic	na		na		0.127	U	0.50	U	na		na		na		0.127	U
Barium	na		na		1.92	B	10.0	U	na		na		na		1.37	
Cadmium	na		na		0.0022	U	0.10	U	na		na		na		0.0133	
Chromium	na		na		0.0033	U	0.10	U	na		na		na		0.0033	U
Lead	na		na		0.0422	U	0.50	U	na		na		na		0.0422	U
Selenium	na		na		0.147	U	0.10	U	na		na		na		0.147	U
Mercury	na		na		0.0	U	0.02	U	na		na		na		0.002	U
ORGANICS: (TCLP)	**µg/L**		**µg/L**		**µg/L**		**µg/L**		**µg/L**		**µg/L**		**µg/L**		**µg/L**	
Chloromethane	na		50	U	na		na		50	U	na		50	U	50	U
Vinyl Chloride	na		10	U	na		na		10	U	na		10	U	10	U
Bromomethane	na		50	U	na		na		50	U	na		50	U	50	U
Chloroethane	na		50	U	na		na		50	U	na		50	U	50	U
Acrolein	na		120	U	na		na		120	U	na		120	U	120	U
Acrylonitrile	na		120	U	na		na		120	U	na		120	U	120	U
Methylene Chloride	na		50	U	na		na		50	U	na		50	U	50	U
1,1-Dichloroethene	na		25	U	na		na		25	U	na		25	U	25	U
trans-1,2-Dichloroethene	na		25	U	na		na		25	U	na		25	U	25	U
1,1-Dichloroethane	na		25	U	na		na		25	U	na		25	U	25	U
Chloroform	na		25	U	na		na		10	J	na		15	J	10	J
1,2-Dichloroethane	na		25	U	na		na		25	U	na		25	U	25	U
1,1,1-Trichloroethane	na		25	U	na		na		25	U	na		25	U	25	U
Carbon Tetrachloride	na		25	U	na		na		25	U	na		25	U	25	U
Trichloroethene	na		25	U	na		na		25	U	na		25	U	25	U
1,2-Dichloropropane	na		25	U	na		na		25	U	na		25	U	25	U
Benzene	25	U	5	U	na		25	U	5	U	na		5	U	5	U
2-Chloroethylvinyl ether	na		50	U	na		na		50	U	na		50	U	50	U
Bromodichloromethane	na		25	U	na		na		25	U	na		25	U	25	U
trans-1,3-Dichloropropene	na		25	U	na		na		25	U	na		25	U	25	U
cis-1,3-Dichloropropene	na		25	U	na		na		25	U	na		25	U	25	U
1,1,2-Trichloroethane	na		25	U	na		na		25	U	na		25	U	25	U
Chlorodibromomethane	na		25	U	na		na		25	U	na		25	U	25	U
Toluene	na		25	U	na		na		25	U	na		25	U	25	U
Tetrachloroethene	na		25	U	na		na		25	U	na		25	U	25	U
Chlorobenzene	na		25	U	na		na		25	U	na		25	U	25	U
Ethylbenzene	na		25	U	na		na		25	U	na		25	U	25	U
Total Xylene	na		25	U	na		na		25	U	na		25	U	25	U
Bromoform	na		25	U	na		na		25	U	na		25	U	25	U
1,1,2,2-Tetrachloroethane	na		25	U	na		na		25	U	na		25	U	25	U

APPENDIX F
POND CLEANUP VERIFICATION ANALYTICAL RESULTS

IT Corp ID#	RU-VSS-08-1		RU-VSS-09		RU-VSS-09-1		RU-VSS-10-1		RU-VSS-11-1		RU-VSS-12		RU-VSS-13		RU-VSS-13-1	
Date Collected	9/9/1995		9/7/1995		9/9/1995		9/9/1995		9/9/1995		10/13/95		10/14/95		10/19/95	
Sample Location	Pond Floor		Pond Floor		Pond Floor		Pond Floor		Pond Floor		Pond Floor		Pond Floor		Pond Floor	
	Conc.	**Q**	**Conc.**	**Q**	**Conc.**	**Q**	**Conc.**	**Q**	**Conc.**	**Q**	**Conc.**	**Q**	**Conc.**	**Q**	**Conc.**	**Q**
TPH:	**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**	
Nonspecific	10	UJ	na		na		176	J	177	J	na		na		na	
Diesel	na		49		na		na		na		320		2,600	D	840	
Waste Oil	na		na		na		na		na		na		25	U	na	
METALS: (TCLP)	**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**	
Silver	na		na		na		na		na		na		na		na	
Arsenic	na		na		na		na		na		na		na		na	
Barium	na		na		na		na		na		na		na		na	
Cadmium	na		na		na		na		na		na		na		na	
Chromium	na		na		na		na		na		na		na		na	
Lead	na		na		na		na		na		na		na		na	
Selenium	na		na		na		na		na		na		na		na	
Mercury	na		na		na		na		na		na		na		na	
ORGANICS: (TCLP)	**µg/L**		**µg/L**		**µg/L**		**µg/L**		**µg/L**		**µg/L**		**µg/L**		**µg/L**	
Chloromethane	na		50	U	na		50	U	50	U	na		na		na	
Vinyl Chloride	na		10	U	na		10	U	10	U	na		na		na	
Bromomethane	na		50	U	na		50	U	50	U	na		na		na	
Chloroethane	na		50	U	na		50	U	50	U	na		na		na	
Acrolein	na		120	U	na		120	U	120	U	na		na		na	
Acrylonitrile	na		120	U	na		120	U	120	U	na		na		na	
Methylene Chloride	na		50	U	na		50	U	50	U	na		na		na	
1,1-Dichloroethene	na		25	U	na		25	U	25	U	na		na		na	
trans-1,2-Dichloroethene	na		25	U	na		25	U	25	U	na		na		na	
1,1-Dichloroethane	na		25	U	na		25	U	25	U	na		na		na	
Chloroform	na		25	U	na		15	J	15	J	na		na		na	
1,2-Dichloroethane	na		25	U	na		25	U	25	U	na		na		na	
1,1,1-Trichloroethane	na		25	U	na		25	U	25	U	na		na		na	
Carbon Tetrachloride	na		25	U	na		25	U	25	U	na		na		na	
Trichloroethene	na		25	U	na		25	U	25	U	na		na		na	
1,2-Dichloropropane	na		25	U	na		25	U	25	U	na		na		na	
Benzene	na		5	U	na		5	U	5	U	25	U	10	U	25	U
2-Chloroethylvinyl ether	na		50	U	na		50	U	50	U	na		na		na	
Bromodichloromethane	na		25	U	na		25	U	25	U	na		na		na	
trans-1,3-Dichloropropene	na		25	U	na		25	U	25	U	na		na		na	
cis-1,3-Dichloropropene	na		25	U	na		25	U	25	U	na		na		na	
1,1,2-Trichloroethane	na		25	U	na		25	U	25	U	na		na		na	
Chlorodibromomethane	na		25	U	na		25	U	25	U	na		na		na	
Toluene	na		25	U	na		25	U	25	U	na		na		na	
Tetrachloroethene	na		25	U	na		25	U	25	U	na		na		na	
Chlorobenzene	na		25	U	na		25	U	25	U	na		na		na	
Ethylbenzene	na		25	U	na		25	U	25	U	na		na		na	
Total Xylene	na		25	U	na		25	U	25	U	na		na		na	
Bromoform	na		25	U	na		25	U	25	U	na		na		na	
1,1,2,2-Tetrachloroethane	na		25	U	na		25	U	25	U	na		na		na	

APPENDIX F
POND CLEANUP VERIFICATION ANALYTICAL RESULTS

IT Corp ID#	RU-VSS-14		RU-VSS-15		RU-VSS-16		RU-VSS-17		RU-VSS-18		RU-VSS-19		RU-VSS-19-1		RU-VSS-20	
Date Collected	10/13/95		10/13/95		10/12/95		10/12/95		10/12/95		10/12/95		10/18/95		10/12/95	
Sample Location	Pond Floor		Pond Floor		Pond Floor		Pond Floor		Pond Floor		Pond Floor		Pond Floor		Pond Floor	
	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
TPH:	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
Nonspecific	na		na		na		na		na		na		na		na	
Diesel	7.1		180		25	U	210		29		16,000		370		2,500	
Waste Oil	na		na		25	U	25	U	na		na		na		na	
METALS: (TCLP)	mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L	
Silver	na		0.50	UJ	na		na		na		na		na		0.50	U
Arsenic	na		0.50	U	na		na		na		na		na		0.50	U
Barium	na		10.0	U	na		na		na		na		na		10.0	U
Cadmium	na		0.10	U	na		na		na		na		na		0.10	U
Chromium	na		0.10	U	na		na		na		na		na		0.10	U
Lead	na		0.50	U	na		na		na		na		na		0.50	U
Selenium	na		0.10	U	na		na		na		na		na		0.10	U
Mercury	na		0.02	U	na		na		na		na		na		0.020	U
ORGANICS: (TCLP)	μg/L		μg/L		μg/L		μg/L		μg/L		μg/L		μg/L		μg/L	
Chloromethane	na		na		na		na		na		na		na		na	
Vinyl Chloride	na		na		na		na		na		na		na		na	
Bromomethane	na		na		na		na		na		na		na		na	
Chloroethane	na		na		na		na		na		na		na		na	
Acrolein	na		na		na		na		na		na		na		na	
Acrylonitrile	na		na		na		na		na		na		na		na	
Methylene Chloride	na		na		na		na		na		na		na		na	
1,1-Dichloroethene	na		na		na		na		na		na		na		na	
trans-1,2-Dichloroethene	na		na		na		na		na		na		na		na	
1,1-Dichloroethane	na		na		na		na		na		na		na		na	
Chloroform	na		na		na		na		na		na		na		na	
1,2-Dichloroethane	na		na		na		na		na		na		na		na	
1,1,1-Trichloroethane	na		na		na		na		na		na		na		na	
Carbon Tetrachloride	na		na		na		na		na		na		na		na	
Trichloroethene	na		na		na		na		na		na		na		na	
1,2-Dichloropropane	na		na		na		na		na		na		na		na	
Benzene	25	U	25	U	10	U	10	U	25	U	25	U	na		25	U
2-Chloroethylvinyl ether	na		na		na		na		na		na		na		na	
Bromodichloromethane	na		na		na		na		na		na		na		na	
trans-1,3-Dichloropropene	na		na		na		na		na		na		na		na	
cis-1,3-Dichloropropene	na		na		na		na		na		na		na		na	
1,1,2-Trichloroethane	na		na		na		na		na		na		na		na	
Chlorodibromomethane	na		na		na		na		na		na		na		na	
Toluene	na		na		na		na		na		na		na		na	
Tetrachloroethene	na		na		na		na		na		na		na		na	
Chlorobenzene	na		na		na		na		na		na		na		na	
Ethylbenzene	na		na		na		na		na		na		na		na	
Total Xylene	na		na		na		na		na		na		na		na	
Bromoform	na		na		na		na		na		na		na		na	
1,1,2,2-Tetrachloroethane	na		na		na		na		na		na		na		na	

APPENDIX F
POND CLEANUP VERIFICATION ANALYTICAL RESULTS

IT Corp ID#	RU-VSS-20-1		RU-VSS-20-2		RU-VSS-120		RU-VSS-21	
Date Collected	10/18/95		10/21/95		10/12/95		10/12/95	
Sample Location	Pond Floor		Pond Floor		Pond Floor		Pond Floor	
	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
TPH:	mg/kg		mg/kg		mg/kg		mg/kg	
Nonspecific	na		na		na		na	
Diesel	1,500		150		na		2.4	U
Waste Oil	na		na		na		na	
METALS: (TCLP)	mg/L		mg/L		mg/L		mg/L	
Silver	na		na		na		na	
Arsenic	na		na		na		na	
Barium	na		na		na		na	
Cadmium	na		na		na		na	
Chromium	na		na		na		na	
Lead	na		na		na		na	
Selenium	na		na		na		na	
Mercury	na		na		na		na	
ORGANICS: (TCLP)	µg/L		µg/L		µg/L		µg/L	
Chloromethane	na		na		na		na	
Vinyl Chloride	na		na		na		na	
Bromomethane	na		na		na		na	
Chloroethane	na		na		na		na	
Acrolein	na		na		na		na	
Acrylonitrile	na		na		na		na	
Methylene Chloride	na		na		na		na	
1,1-Dichloroethene	na		na		na		na	
trans-1,2-Dichloroethene	na		na		na		na	
1,1-Dichloroethane	na		na		na		na	
Chloroform	na		na		na		na	
1,2-Dichloroethane	na		na		na		na	
1,1,1-Trichloroethane	na		na		na		na	
Carbon Tetrachloride	na		na		na		na	
Trichloroethene	na		na		na		na	
1,2-Dichloropropane	na		na		na		na	
Benzene	na		na		na		25	U
2-Chloroethylvinyl ether	na		na		na		na	
Bromodichloromethane	na		na		na		na	
trans-1,3-Dichloropropene	na		na		na		na	
cis-1,3-Dichloropropene	na		na		na		na	
1,1,2-Trichloroethane	na		na		na		na	
Chlorodibromomethane	na		na		na		na	
Toluene	na		na		na		na	
Tetrachloroethene	na		na		na		na	
Chlorobenzene	na		na		na		na	
Ethylbenzene	na		na		na		na	
Total Xylene	na		na		na		na	
Bromoform	na		na		na		na	
1,1,2,2-Tetrachloroethane	na		na		na		na	

IT Corp ID#	RU-VSS-22		RU-VSS-23		RU-VSS-24		RU-VSS-25	
Date Collected	10/12/95		10/12/95		10/12/95		10/13/95	
Sample Location	Pond Floor		Pond Floor		Pond Floor		Pond Floor	
	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
TPH:	mg/kg		mg/kg		mg/kg		mg/kg	
Nonspecific	na		na		na		na	
Diesel	370		25	U	170		680	
Waste Oil	na		25	U	25	U	na	
METALS: (TCLP)	mg/L		mg/L		mg/L		mg/L	
Silver	na		na		na		0.50	UJ
Arsenic	na		na		na		0.50	U
Barium	na		na		na		10.0	U
Cadmium	na		na		na		0.10	U
Chromium	na		na		na		0.10	U
Lead	na		na		na		0.50	U
Selenium	na		na		na		0.10	U
Mercury	na		na		na		0.02	U
ORGANICS: (TCLP)	µg/L		µg/L		µg/L		µg/L	
Chloromethane	na		na		na		na	
Vinyl Chloride	na		na		na		na	
Bromomethane	na		na		na		na	
Chloroethane	na		na		na		na	
Acrolein	na		na		na		na	
Acrylonitrile	na		na		na		na	
Methylene Chloride	na		na		na		na	
1,1-Dichloroethene	na		na		na		na	
trans-1,2-Dichloroethene	na		na		na		na	
1,1-Dichloroethane	na		na		na		na	
Chloroform	na		na		na		na	
1,2-Dichloroethane	na		na		na		na	
1,1,1-Trichloroethane	na		na		na		na	
Carbon Tetrachloride	na		na		na		na	
Trichloroethene	na		na		na		na	
1,2-Dichloropropane	na		na		na		na	
Benzene	25	U	10	U	10	U	25	U
2-Chloroethylvinyl ether	na		na		na		na	
Bromodichloromethane	na		na		na		na	
trans-1,3-Dichloropropene	na		na		na		na	
cis-1,3-Dichloropropene	na		na		na		na	
1,1,2-Trichloroethane	na		na		na		na	
Chlorodibromomethane	na		na		na		na	
Toluene	na		na		na		na	
Tetrachloroethene	na		na		na		na	
Chlorobenzene	na		na		na		na	
Ethylbenzene	na		na		na		na	
Total Xylene	na		na		na		na	
Bromoform	na		na		na		na	
1,1,2,2-Tetrachloroethane	na		na		na		na	

APPENDIX F
POND CLEANUP VERIFICATION ANALYTICAL RESULTS

IT Corp ID#	RU-VSS-26		RU-VSS-26-1		RU-VSS-27		RU-VSS-27-12		RU-VSS-28		RU-VSS-29		RU-VSS-29-1		RU-VSS-30	
Date Collected	10/13/95		10/18/95		10/14/95		10/14/95		10/13/95		10/13/95		10/18/95		10/12/95	
Sample Location	Pond Floor		Pond Floor		Pond Floor		Pond Floor		Pond Floor		Pond Floor		Pond Floor		Pond Floor	
	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
TPH:	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
Nonspecific	na		na		na		na		na		na		na		na	
Diesel	1,400		31		160		740		77		2,000	*	77		36	
Waste Oil	na		na		25	U	na		na		na		na		25	U
METALS: (TCLP)	mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L	
Silver	na		na		0.006	U	0.50	U	na		na		na		0.006	U
Arsenic	na		na		0.0377	U	0.50	U	na		na		na		0.0377	UJ
Barium	na		na		2.42		10.0	U	na		na		na		1.32	
Cadmium	na		na		0.0058		0.10	U	na		na		na		0.0045	U
Chromium	na		na		0.0037	U	0.10	U	na		na		na		0.0037	U
Lead	na		na		0.0382	U	0.50	U	na		na		na		0.0382	U
Selenium	na		na		0.055	B	0.10	U	na		na		na		0.0426	U
Mercury	na		na		0.0001	U	0.020	U	na		na		na		0.0001	U
ORGANICS: (TCLP)	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
Chloromethane	na		na		na		na		na		na		na		na	
Vinyl Chloride	na		na		na		na		na		na		na		na	
Bromomethane	na		na		na		na		na		na		na		na	
Chloroethane	na		na		na		na		na		na		na		na	
Acrolein	na		na		na		na		na		na		na		na	
Acrylonitrile	na		na		na		na		na		na		na		na	
Methylene Chloride	na		na		na		na		na		na		na		na	
1,1-Dichloroethene	na		na		na		na		na		na		na		na	
trans-1,2-Dichloroethene	na		na		na		na		na		na		na		na	
1,1-Dichloroethane	na		na		na		na		na		na		na		na	
Chloroform	na		na		na		na		na		na		na		na	
1,2-Dichloroethane	na		na		na		na		na		na		na		na	
1,1,1-Trichloroethane	na		na		na		na		na		na		na		na	
Carbon Tetrachloride	na		na		na		na		na		na		na		na	
Trichloroethene	na		na		na		na		na		na		na		na	
1,2-Dichloropropane	na		na		na		na		na		na		na		na	
Benzene	25	U	na		10	U	25	U	25	U	25	U	na		10	U
2-Chloroethylvinyl ether	na		na		na		na		na		na		na		na	
Bromodichloromethane	na		na		na		na		na		na		na		na	
trans-1,3-Dichloropropene	na		na		na		na		na		na		na		na	
cis-1,3-Dichloropropene	na		na		na		na		na		na		na		na	
1,1,2-Trichloroethane	na		na		na		na		na		na		na		na	
Chlorodibromomethane	na		na		na		na		na		na		na		na	
Toluene	na		na		na		na		na		na		na		na	
Tetrachloroethene	na		na		na		na		na		na		na		na	
Chlorobenzene	na		na		na		na		na		na		na		na	
Ethylbenzene	na		na		na		na		na		na		na		na	
Total Xylene	na		na		na		na		na		na		na		na	
Bromoform	na		na		na		na		na		na		na		na	
1,1,2,2-Tetrachloroethane	na		na		na		na		na		na		na		na	

APPENDIX F
POND CLEANUP VERIFICATION ANALYTICAL RESULTS

IT Corp ID#	RU-VSS-31		RU-VSS-131		RU-VSS-32		RU-VSS-33		RU-VSS-34		RU-VSS-34-1		RU-VSS-34-2		RU-VSS-34-12		RU-VSS-35	
Date Collected	10/12/95		10/12/95		10/12/95		10/12/95		10/12/95		10/18/95		10/21/95		10/14/95		10/13/95	
Sample Location	Pond Floor		Pond Floor		Pond Floor		Pond Floor		Pond Floor		Pond Floor		Pond Floor		Pond Floor		Pond Floor	
	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
TPH:	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
Nonspecific	na		na		na		na		na		na		na		na		na	
Diesel	30	*	na		170		340		1,400		1,700		140		310		600	
Waste Oil	na		na		na		na		na		na		na		na		na	
METALS: (TCLP)	mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L	
Silver	na		na		na		na		na		na		na		0.50	U	0.50	UJ
Arsenic	na		na		na		na		na		na		na		0.50	U	0.50	U
Barium	na		na		na		na		na		na		na		10.0	U	10.0	U
Cadmium	na		na		na		na		na		na		na		0.10	U	0.10	U
Chromium	na		na		na		na		na		na		na		0.10	U	0.10	U
Lead	na		na		na		na		na		na		na		0.50	U	0.50	U
Selenium	na		na		na		na		na		na		na		0.10	U	0.10	U
Mercury	na		na		na		na		na		na		na		0.020	U	0.020	U
ORGANICS: (TCLP)	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
Chloromethane	na		na		na		na		na		na		na		na		na	
Vinyl Chloride	na		na		na		na		na		na		na		na		na	
Bromomethane	na		na		na		na		na		na		na		na		na	
Chloroethane	na		na		na		na		na		na		na		na		na	
Acrolein	na		na		na		na		na		na		na		na		na	
Acrylonitrile	na		na		na		na		na		na		na		na		na	
Methylene Chloride	na		na		na		na		na		na		na		na		na	
1,1-Dichloroethene	na		na		na		na		na		na		na		na		na	
trans-1,2-Dichloroethene	na		na		na		na		na		na		na		na		na	
1,1-Dichloroethane	na		na		na		na		na		na		na		na		na	
Chloroform	na		na		na		na		na		na		na		na		na	
1,2-Dichloroethane	na		na		na		na		na		na		na		na		na	
1,1,1-Trichloroethane	na		na		na		na		na		na		na		na		na	
Carbon Tetrachloride	na		na		na		na		na		na		na		na		na	
Trichloroethene	na		na		na		na		na		na		na		na		na	
1,2-Dichloropropane	na		na		na		na		na		na		na		na		na	
Benzene	25	U	na		25	U	25	U	25	U	na		na		25	U	25	U
2-Chloroethylvinyl ether	na		na		na		na		na		na		na		na		na	
Bromodichloromethane	na		na		na		na		na		na		na		na		na	
trans-1,3-Dichloropropene	na		na		na		na		na		na		na		na		na	
cis-1,3-Dichloropropene	na		na		na		na		na		na		na		na		na	
1,1,2-Trichloroethane	na		na		na		na		na		na		na		na		na	
Chlorodibromomethane	na		na		na		na		na		na		na		na		na	
Toluene	na		na		na		na		na		na		na		na		na	
Tetrachloroethene	na		na		na		na		na		na		na		na		na	
Chlorobenzene	na		na		na		na		na		na		na		na		na	
Ethylbenzene	na		na		na		na		na		na		na		na		na	
Total Xylene	na		na		na		na		na		na		na		na		na	
Bromoform	na		na		na		na		na		na		na		na		na	
1,1,2,2-Tetrachloroethane	na		na		na		na		na		na		na		na		na	

APPENDIX F
POND CLEANUP VERIFICATION ANALYTICAL RESULTS

IT Corp ID#	RU-VSS-36		RU-VSS-37		RU-VSS-38		RU-VSS-40		RU-VSS-41		RU-VSS-42		RU-VSS-43		RU-VSS-44		RU-VSS-45	
Date Collected	10/12/95		10/12/95		10/12/95		10/12/95		10/13/95		10/13/95		10/19/95		10/19/95		11/01/95	
Sample Location	Pond Floor		Pond Floor		Pond Floor		Pond Floor		Pond Floor		Pond Floor		Pond Floor		Pond Floor		Pond Floor	
	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
TPH:	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
Nonspecific	na		na		na		na		na		na		na		na		na	
Diesel	590		72		540		25	U	240		49		170		470		45	
Waste Oil	na		na		na		25	U	na		na		na		na		na	
METALS: (TCLP)	mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L	
Silver	na		na		na		0.006	U	0.50	UJ	na		na		na		na	
Arsenic	na		na		na		0.0377	UJ	0.50	U	na		na		na		na	
Barium	na		na		na		1.16		10.0	U	na		na		na		na	
Cadmium	na		na		na		0.0023	U	0.10	U	na		na		na		na	
Chromium	na		na		na		0.0058	U	0.10	U	na		na		na		na	
Lead	na		na		na		0.0382	U	0.50	U	na		na		na		na	
Selenium	na		na		na		0.0426	U	0.10	U	na		na		na		na	
Mercury	na		na		na		0.0001	U	0.020	U	na		na		na		na	
ORGANICS: (TCLP)	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
Chloromethane	na		na		na		na		na		na		na		na		na	
Vinyl Chloride	na		na		na		na		na		na		na		na		na	
Bromomethane	na		na		na		na		na		na		na		na		na	
Chloroethane	na		na		na		na		na		na		na		na		na	
Acrolein	na		na		na		na		na		na		na		na		na	
Acrylonitrile	na		na		na		na		na		na		na		na		na	
Methylene Chloride	na		na		na		na		na		na		na		na		na	
1,1-Dichloroethene	na		na		na		na		na		na		na		na		na	
trans-1,2-Dichloroethene	na		na		na		na		na		na		na		na		na	
1,1-Dichloroethane	na		na		na		na		na		na		na		na		na	
Chloroform	na		na		na		na		na		na		na		na		na	
1,2-Dichloroethane	na		na		na		na		na		na		na		na		na	
1,1,1-Trichloroethane	na		na		na		na		na		na		na		na		na	
Carbon Tetrachloride	na		na		na		na		na		na		na		na		na	
Trichloroethene	na		na		na		na		na		na		na		na		na	
1,2-Dichloropropane	na		na		na		na		na		na		na		na		na	
Benzene	25	U	25	U	25	U	10	U	25	U	25	U	0.025	U	0.025	U	25	U
2-Chloroethylvinyl ether	na		na		na		na		na		na		na		na		na	
Bromodichloromethane	na		na		na		na		na		na		na		na		na	
trans-1,3-Dichloropropene	na		na		na		na		na		na		na		na		na	
cis-1,3-Dichloropropene	na		na		na		na		na		na		na		na		na	
1,1,2-Trichloroethane	na		na		na		na		na		na		na		na		na	
Chlorodibromomethane	na		na		na		na		na		na		na		na		na	
Toluene	na		na		na		na		na		na		na		na		na	
Tetrachloroethene	na		na		na		na		na		na		na		na		na	
Chlorobenzene	na		na		na		na		na		na		na		na		na	
Ethylbenzene	na		na		na		na		na		na		na		na		na	
Total Xylene	na		na		na		na		na		na		na		na		na	
Bromoform	na		na		na		na		na		na		na		na		na	
1,1,2,2-Tetrachloroethane	na		na		na		na		na		na		na		na		na	

APPENDIX F
POND CLEANUP VERIFICATION ANALYTICAL RESULTS

IT Corp ID#	RU-VSS-46		RU-VSS-47		RU-VSS-48		RU-VSS-49		RU-VSS-49-12		RU-VSS-49-12S		RU-VSS-50		RU-VSS-51	
Date Collected	11/01/95		11/01/95		10/19/95		10/13/95		10/14/95		10/14/95		10/13/95		10/12/95	
Sample Location	Pond Floor		Pond Floor		Pond Floor		Pond Floor		Pond Floor		Pond Floor		Pond Floor		Pond Floor	
	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
TPH:	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
Nonspecific	na		na		na		na		na		na		na		na	
Diesel	21		67		790		110		350		120		1,000		60	
Waste Oil	na		na		na		na		na		25	U	na		25	U
METALS: (TCLP)	mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L	
Silver	na		0.50	U	na		na		0.50	U	6.0	U	0.50	UJ	na	
Arsenic	na		0.50	U	na		na		0.50	U	37.7	U	0.50	U	na	
Barium	na		10.0	U	na		na		10.0	U	1480		10.0	U	na	
Cadmium	na		0.10	U	na		na		0.10	U	2.3	U	0.10	U	na	
Chromium	na		0.10	U	na		na		0.10	U	4.8	B	0.10	U	na	
Lead	na		0.50	U	na		na		0.50	U	38.2	U	0.50	U	na	
Selenium	na		0.10	U	na		na		0.10	U	58.8	B	0.10	U	na	
Mercury	na		0.020	U	na		na		0.020	U	0.10	U	0.020	U	na	
ORGANICS: (TCLP)	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
Chloromethane	na		na		na		na		na		na		na		na	
Vinyl Chloride	na		na		na		na		na		na		na		na	
Bromomethane	na		na		na		na		na		na		na		na	
Chloroethane	na		na		na		na		na		na		na		na	
Acrolein	na		na		na		na		na		na		na		na	
Acrylonitrile	na		na		na		na		na		na		na		na	
Methylene Chloride	na		na		na		na		na		na		na		na	
1,1-Dichloroethene	na		na		na		na		na		na		na		na	
trans-1,2-Dichloroethene	na		na		na		na		na		na		na		na	
1,1-Dichloroethane	na		na		na		na		na		na		na		na	
Chloroform	na		na		na		na		na		na		na		na	
1,2-Dichloroethane	na		na		na		na		na		na		na		na	
1,1,1-Trichloroethane	na		na		na		na		na		na		na		na	
Carbon Tetrachloride	na		na		na		na		na		na		na		na	
Trichloroethene	na		na		na		na		na		na		na		na	
1,2-Dichloropropane	na		na		na		na		na		na		na		na	
Benzene	25	U	25	U	0.025	U	25	U	25	U	10	U	25	U	10	U
2-Chloroethylvinyl ether	na		na		na		na		na		na		na		na	
Bromodichloromethane	na		na		na		na		na		na		na		na	
trans-1,3-Dichloropropene	na		na		na		na		na		na		na		na	
cis-1,3-Dichloropropene	na		na		na		na		na		na		na		na	
1,1,2-Trichloroethane	na		na		na		na		na		na		na		na	
Chlorodibromomethane	na		na		na		na		na		na		na		na	
Toluene	na		na		na		na		na		na		na		na	
Tetrachloroethene	na		na		na		na		na		na		na		na	
Chlorobenzene	na		na		na		na		na		na		na		na	
Ethylbenzene	na		na		na		na		na		na		na		na	
Total Xylene	na		na		na		na		na		na		na		na	
Bromoform	na		na		na		na		na		na		na		na	
1,1,2,2-Tetrachloroethane	na		na		na		na		na		na		na		na	

APPENDIX F

POND CLEANUP VERIFICATION ANALYTICAL RESULTS

IT Corp ID#	RU-VSS-52		RU-VSS-53		RU-VSS-54		RU-VSS-55		RU-VSS-T01		RU-VSS-T01-07		RU-VSS-T01-19	
Date Collected	10/12/95		11/6/1995		11/6/1995		11/6/1995		9/21/1995		9/21/1995		9/21/1995	
Sample Location	Pond Floor		Pond Floor		Pond Floor		Pond Floor		Test Pit 01		Test Pit 01		Test Pit 01	
	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
TPH:	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
Nonspecific	na		na		na		na		na		na		na	
Diesel	2.4	U	27		60		38		na		300		330	
Waste Oil	na		na		na		na		na		na		na	
METALS: (TCLP)	mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L	
Silver	na		na		na		na		0.50	U	na		na	
Arsenic	na		na		na		na		0.50	U	na		na	
Barium	na		na		na		na		10.0	U	na		na	
Cadmium	na		na		na		na		0.10	U	na		na	
Chromium	na		na		na		na		0.10	U	na		na	
Lead	na		na		na		na		0.50	U	na		na	
Selenium	na		na		na		na		0.10	U	na		na	
Mercury	na		na		na		na		0.020	U	na		na	
ORGANICS: (TCLP)	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
Chloromethane	na		na		na		na		na		na		na	
Vinyl Chloride	na		na		na		na		na		na		na	
Bromomethane	na		na		na		na		na		na		na	
Chloroethane	na		na		na		na		na		na		na	
Acrolein	na		na		na		na		na		na		na	
Acrylonitrile	na		na		na		na		na		na		na	
Methylene Chloride	na		na		na		na		na		na		na	
1,1-Dichloroethene	na		na		na		na		na		na		na	
trans-1,2-Dichloroethene	na		na		na		na		na		na		na	
1,1-Dichloroethane	na		na		na		na		na		na		na	
Chloroform	na		na		na		na		na		na		na	
1,2-Dichloroethane	na		na		na		na		na		na		na	
1,1,1-Trichloroethane	na		na		na		na		na		na		na	
Carbon Tetrachloride	na		na		na		na		na		na		na	
Trichloroethene	na		na		na		na		na		na		na	
1,2-Dichloropropane	na		na		na		na		na		na		na	
Benzene	25	U	25	U	25	U	25	U	ND		na		na	
2-Chloroethylvinyl ether	na		na		na		na		na		na		na	
Bromodichloromethane	na		na		na		na		na		na		na	
trans-1,3-Dichloropropene	na		na		na		na		na		na		na	
cis-1,3-Dichloropropene	na		na		na		na		na		na		na	
1,1,2-Trichloroethane	na		na		na		na		na		na		na	
Chlorodibromomethane	na		na		na		na		na		na		na	
Toluene	na		na		na		na		na		na		na	
Tetrachloroethene	na		na		na		na		na		na		na	
Chlorobenzene	na		na		na		na		na		na		na	
Ethylbenzene	na		na		na		na		na		na		na	
Total Xylene	na		na		na		na		na		na		na	
Bromoform	na		na		na		na		na		na		na	
1,1,2,2-Tetrachloroethane	na		na		na		na		na		na		na	

APPENDIX F
POND CLEANUP VERIFICATION ANALYTICAL RESULTS

IT Corp ID#	RU-VSS-T02-15.5		RU-VSS-T02-23		RU-VSS-T02-31.5		RU-VSS-T03-26		RU-VSS-T03-39		RU-VSS-T04		RU-VSS-T04-14	
Date Collected	9/20/1995		9/20/1995		9/20/1995		9/20/1995		9/20/1995		9/21/1995		9/21/1995	
Sample Location	Test Pit 02		Test Pit 02		Test Pit 02		Test Pit 03		Test Pit 03		Test Pit 04		Test Pit 04	
	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
TPH:	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
Nonspecific	na		na		na		na		na		na		na	
Diesel	20		40		4.4		56		41		na		3,500	
Waste Oil	na		na		na		na		na		na		na	
METALS: (TCLP)	mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L	
Silver	na		na		na		na		na		0.50	U	na	
Arsenic	na		na		na		na		na		0.50	U	na	
Barium	na		na		na		na		na		10.0	U	na	
Cadmium	na		na		na		na		na		0.10	U	na	
Chromium	na		na		na		na		na		0.10	U	na	
Lead	na		na		na		na		na		0.50	U	na	
Selenium	na		na		na		na		na		0.10	U	na	
Mercury	na		na		na		na		na		0.020	U	na	
ORGANICS: (TCLP)	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
Chloromethane	na		na		na		na		na		na		na	
Vinyl Chloride	na		na		na		na		na		na		na	
Bromomethane	na		na		na		na		na		na		na	
Chloroethane	na		na		na		na		na		na		na	
Acrolein	na		na		na		na		na		na		na	
Acrylonitrile	na		na		na		na		na		na		na	
Methylene Chloride	na		na		na		na		na		na		na	
1,1-Dichloroethene	na		na		na		na		na		na		na	
trans-1,2-Dichloroethene	na		na		na		na		na		na		na	
1,1-Dichloroethane	na		na		na		na		na		na		na	
Chloroform	na		na		na		na		na		na		na	
1,2-Dichloroethane	na		na		na		na		na		na		na	
1,1,1-Trichloroethane	na		na		na		na		na		na		na	
Carbon Tetrachloride	na		na		na		na		na		na		na	
Trichloroethene	na		na		na		na		na		na		na	
1,2-Dichloropropane	na		na		na		na		na		na		na	
Benzene	na		na		na		na		na		ND		na	
2-Chloroethylvinyl ether	na		na		na		na		na		na		na	
Bromodichloromethane	na		na		na		na		na		na		na	
trans-1,3-Dichloropropene	na		na		na		na		na		na		na	
cis-1,3-Dichloropropene	na		na		na		na		na		na		na	
1,1,2-Trichloroethane	na		na		na		na		na		na		na	
Chlorodibromomethane	na		na		na		na		na		na		na	
Toluene	na		na		na		na		na		na		na	
Tetrachloroethene	na		na		na		na		na		na		na	
Chlorobenzene	na		na		na		na		na		na		na	
Ethylbenzene	na		na		na		na		na		na		na	
Total Xylene	na		na		na		na		na		na		na	
Bromoform	na		na		na		na		na		na		na	
1,1,2,2-Tetrachloroethane	na		na		na		na		na		na		na	

APPENDIX F
POND CLEANUP VERIFICATION ANALYTICAL RESULTS

IT Corp ID#	RU-VSS-T04-23		RU-VSS-T05-14		RU-VSS-T05-24		RU-VSS-T05-30		RU-VSS-T06-7		RU-VSS-T06-15		RU-VSS-T06-22	
Date Collected	9/21/1995		9/26/1995		9/26/1995		9/26/1995		9/26/1995		9/26/1995		9/26/1995	
Sample Location	Test Pit 04		Test Pit 05		Test Pit 05		Test Pit 05		Test Pit 06		Test Pit 06		Test Pit 06	
	Conc.	**Q**	**Conc.**	**Q**	**Conc.**	**Q**	**Conc.**	**Q**	**Conc.**	**Q**	**Conc.**	**Q**	**Conc.**	**Q**
TPH:	**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**	
Nonspecific	na		na		na		na		na		na		na	
Diesel	3,100		200		14		2.5	U	23		45		2.1	U
Waste Oil	na		na		na		na		na		na		na	
METALS: (TCLP)	**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**	
Silver	na		na		na		na		na		na		na	
Arsenic	na		na		na		na		na		na		na	
Barium	na		na		na		na		na		na		na	
Cadmium	na		na		na		na		na		na		na	
Chromium	na		na		na		na		na		na		na	
Lead	na		na		na		na		na		na		na	
Selenium	na		na		na		na		na		na		na	
Mercury	na		na		na		na		na		na		na	
ORGANICS: (TCLP)	**µg/L**		**µg/L**		**µg/L**		**µg/L**		**µg/L**		**µg/L**		**µg/L**	
Chloromethane	na		na		na		na		na		na		na	
Vinyl Chloride	na		na		na		na		na		na		na	
Bromomethane	na		na		na		na		na		na		na	
Chloroethane	na		na		na		na		na		na		na	
Acrolein	na		na		na		na		na		na		na	
Acrylonitrile	na		na		na		na		na		na		na	
Methylene Chloride	na		na		na		na		na		na		na	
1,1-Dichloroethene	na		na		na		na		na		na		na	
trans-1,2-Dichloroethene	na		na		na		na		na		na		na	
1,1-Dichloroethane	na		na		na		na		na		na		na	
Chloroform	na		na		na		na		na		na		na	
1,2-Dichloroethane	na		na		na		na		na		na		na	
1,1,1-Trichloroethane	na		na		na		na		na		na		na	
Carbon Tetrachloride	na		na		na		na		na		na		na	
Trichloroethene	na		na		na		na		na		na		na	
1,2-Dichloropropane	na		na		na		na		na		na		na	
Benzene	na		na		na		na		na		na		na	
2-Chloroethylvinyl ether	na		na		na		na		na		na		na	
Bromodichloromethane	na		na		na		na		na		na		na	
trans-1,3-Dichloropropene	na		na		na		na		na		na		na	
cis-1,3-Dichloropropene	na		na		na		na		na		na		na	
1,1,2-Trichloroethane	na		na		na		na		na		na		na	
Chlorodibromomethane	na		na		na		na		na		na		na	
Toluene	na		na		na		na		na		na		na	
Tetrachloroethene	na		na		na		na		na		na		na	
Chlorobenzene	na		na		na		na		na		na		na	
Ethylbenzene	na		na		na		na		na		na		na	
Total Xylene	na		na		na		na		na		na		na	
Bromoform	na		na		na		na		na		na		na	
1,1,2,2-Tetrachloroethane	na		na		na		na		na		na		na	

APPENDIX F
POND CLEANUP VERIFICATION ANALYTICAL RESULTS

IT Corp ID#	RU-VSS-205		RU-VSS-215		RU-VSS-225		RU-VSS-227		RU-VSS-235		RU-VSS-241		RU-VSS-247		RU-VSS-253	
Date Collected	10/13/95		10/13/95		10/13/95		10/14/95		10/13/95		10/13/95		11/1/1995		11/6/1995	
Sample Location	Pond Floor		Pond Floor		Pond Floor		Pond Floor		Pond Floor		Pond Floor		Pond Floor		Pond Floor	
	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q	Conc.	Q
TPH:	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
Nonspecific	na		na		na		na		na		na		na		na	
Diesel	30		240		500		170		440		380		45		25	U
Waste Oil	25	U	25	U	24	U	na		25	U	24	U	24	U	25	U
METALS: (TCLP)	mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L	
Silver	0.01	U	0.01	U	0.01	U	0.50	U	0.01	U	0.01	U	0.01	U	na	
Arsenic	0.5	U	0.5	U	0.5	U	0.50	U	0.5	U	0.5	U	0.50	U	na	
Barium	1.28		1.04		1.81		10.0	U	2.07		1.67		0.94		na	
Cadmium	0.05	U	0.0063		0.0105		0.10	U	0.007		0.0054		0.0030	B	na	
Chromium	0.02	U	0.02	U	0.0218		0.10	U	0.02	U	0.02	U	0.020	U	na	
Lead	0.1	U	0.1	U	0.1	U	0.50	U	0.1	U	0.1	U	0.10	U	na	
Selenium	0.25	U	0.25	U	0.25	U	0.10	U	0.25	U	0.25	U	0.25	U	na	
Mercury	0.0002	U	0.0002	U	0.0002	U	0.020	U	0.0002	U	0.0002	U	0.00010	B	na	
ORGANICS: (TCLP)	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
Chloromethane	na		na		na		na		na		na		na		na	
Vinyl Chloride	na		na		na		na		na		na		na		na	
Bromomethane	na		na		na		na		na		na		na		na	
Chloroethane	na		na		na		na		na		na		na		na	
Acrolein	na		na		na		na		na		na		na		na	
Acrylonitrile	na		na		na		na		na		na		na		na	
Methylene Chloride	na		na		na		na		na		na		na		na	
1,1-Dichloroethene	na		na		na		na		na		na		na		na	
trans-1,2-Dichloroethene	na		na		na		na		na		na		na		na	
1,1-Dichloroethane	na		na		na		na		na		na		na		na	
Chloroform	na		na		na		na		na		na		na		na	
1,2-Dichloroethane	na		na		na		na		na		na		na		na	
1,1,1-Trichloroethane	na		na		na		na		na		na		na		na	
Carbon Tetrachloride	na		na		na		na		na		na		na		na	
Trichloroethene	na		na		na		na		na		na		na		na	
1,2-Dichloropropane	na		na		na		na		na		na		na		na	
Benzene	10	U	10	U	10	U	25	U	10	U	10	U	10	U	10	U
2-Chloroethylvinyl ether	na		na		na		na		na		na		na		na	
Bromodichloromethane	na		na		na		na		na		na		na		na	
trans-1,3-Dichloropropene	na		na		na		na		na		na		na		na	
cis-1,3-Dichloropropene	na		na		na		na		na		na		na		na	
1,1,2-Trichloroethane	na		na		na		na		na		na		na		na	
Chlorodibromomethane	na		na		na		na		na		na		na		na	
Toluene	na		na		na		na		na		na		na		na	
Tetrachloroethene	na		na		na		na		na		na		na		na	
Chlorobenzene	na		na		na		na		na		na		na		na	
Ethylbenzene	na		na		na		na		na		na		na		na	
Total Xylene	na		na		na		na		na		na		na		na	
Bromoform	na		na		na		na		na		na		na		na	
1,1,2,2-Tetrachloroethane	na		na		na		na		na		na		na		na	

APPENDIX F
POND CLEANUP VERIFICATION ANALYTICAL RESULTS

IT Corp ID#	RU-VSS-255	
Date Collected	11/6/1995	
Sample Location	Pond Floor	
	Conc.	Q
TPH:	**mg/kg**	
Nonspecific	na	
Diesel	25	U
Waste Oil	25	U
METALS: (TCLP)	**mg/L**	
Silver	na	
Arsenic	na	
Barium	na	
Cadmium	na	
Chromium	na	
Lead	na	
Selenium	na	
Mercury	na	
ORGANICS: (TCLP)	**μg/L**	
Chloromethane	na	
Vinyl Chloride	na	
Bromomethane	na	
Chloroethane	na	
Acrolein	na	
Acrylonitrile	na	
Methylene Chloride	na	
1,1-Dichloroethene	na	
trans-1,2-Dichloroethene	na	
1,1-Dichloroethane	na	
Chloroform	na	
1,2-Dichloroethane	na	
1,1,1-Trichloroethane	na	
Carbon Tetrachloride	na	
Trichloroethene	na	
1,2-Dichloropropane	na	
Benzene	10	U
2-Chloroethylvinyl ether	na	
Bromodichloromethane	na	
trans-1,3-Dichloropropene	na	
cis-1,3-Dichloropropene	na	
1,1,2-Trichloroethane	na	
Chlorodibromomethane	na	
Toluene	na	
Tetrachloroethene	na	
Chlorobenzene	na	
Ethylbenzene	na	
Total Xylene	na	
Bromoform	na	
1,1,2,2-Tetrachloroethane	na	

Q=Data qualifier.
U = Compound was analyzed but not detected above the specified limit.
J = Reported value is estimated.
B = In organics, the analyte was found in the blank. In inorganics, the result is above the Instrument Detection Limit but below the Contract Required Detection Limit.
N = Presumptive identification of a tentatively identified compound based on a mass spectral library search.
mg/kg = milligrams per kilogram
mg/L = milligrams per liter
ug/L = micrograms per liter
* Matrix interference experienced with this analysis
D=TPH Diesel concentration for RU-VSS-13 is from a 1:5 dilution.
na = not analyzed
ND = parameter was analyzed for but not detected.

Appendix F

Laboratory Certifications and Analytical Results from Quarterly Sampling Events

F-1 Dates of Quarterly Sampling Events

Table F-1
Quarterly Sampling Events

Quarterly Sampling Event	Date Conducted	Sampling Conducted By
First Quarter, 1996	April 10-11, 1996	DOE/EPA
Second Quarter, 1996	June 4-5, 1996	DOE/EPA
Third Quarter, 1996	October 8-9, 1996	DOE/EPA/IT
Fourth Quarter, 1996	December 3-4, 1996	EPA
First Quarter, 1997	March 27, 1997	IT Corporation
Second Quarter, 1997	June 12, 1997	IT Corporation
Third Quarter, 1997	August 21, 1997	IT Corporation
Fourth Quarter, 1997	November 6, 1997	IT Corporation

F-2 First Quarter 1996 Analytical Results

Quanterra Incorporated
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Quanterra
Environmental Services

EXECUTIVE SUMMARY

FOR

ENVIRONMENTAL PROTECTION AGENCY - LAS VEGAS

QUANTERRA NO. 048293

MAY 10, 1996

Prepared by: Lisa L. Anderson
Lisa L. Anderson

Reviewed by: Ellen LaRiviere
Ellen LaRiviere

Quanterra
Environmental
Services

I. EXECUTIVE OVERVIEW

On April 12, 1996, Quanterra Environmental Services, Denver received seven aqueous samples from the Environmental Protection Agency - Las Vegas.

This report presents the analytical results as well as supporting information to aid in the evaluation and interpretation of the data and is arranged in the following order:

- Overview
- Sample Description Information/Analytical Test Requests
- Analytical Results
- Quality Control Report

Volatile Organics by Chromatography

Samples 048293-0001 through -0006 were analyzed for Gasoline Range Organics (GROs) by Method 8020.

Semivolatile Organics by Gas Chromatography

Samples 048293-0001 through -0005 were analyzed for extractable petroleum hydrocarbons by Method GC/FID.

Because the laboratory has seen some intermittent laboratory contamination in the Diesel Range Organic analyses, laboratory contamination was suspected in samples 048293-0004 and -0005, and the associated Laboratory Control Sample (LCS). Peaks similar to those observed in other known contaminated samples were seen in the chromatograms for samples -0004-SA and -0005-SA and resulted in positive extractable petroleum hydrocarbon results for these samples. The client was notified on May 6, 1996 and advised the laboratory to re-extract and analyze the samples outside of holding time to confirm the results. The samples extracted outside of holding time, reported as samples 048293-0004-RE and -0005-RE, contained no extractable petroleum hydrocarbons, indicating that contamination had, in fact, occurred in the original preparation of the samples.

Metals

Samples 048293-0001 through -0005, and -0007 were analyzed for dissolved metals by Method 6010 and for dissolved mercury by Method 7470. The samples were preserved in the field and filtered in the laboratory prior to analysis. The results for these samples may be biased high due to potential metals leaching from particulate matter present in the samples.

Reporting limits were raised for Arsenic by Trace-ICP for samples 048293-0001 through -0004 due to matrix interference.

With the exceptions listed above or on the data sheets, standard analytical protocols were followed in the analyses of the samples and no problems were encountered or anomalies observed. All laboratory QC samples analyzed in conjunction with the samples in this project were within established control limits.

Quanterra
Environmental
Services

SAMPLE DESCRIPTION INFORMATION
for
EPA L.V. Nevada

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
048293-0001-SA	WELL RU-03	AQUEOUS	11 APR 96	14:40	12 APR 96
048293-0002-SA	WELL RU-6A	AQUEOUS	11 APR 96	15:35	12 APR 96
048293-0003-SA	WELL RU-4A	AQUEOUS	11 APR 96	15:50	12 APR 96
048293-0004-SA	WELL RU-8	AQUEOUS	11 APR 96	16:25	12 APR 96
048293-0005-SA	WELL RU-5	AQUEOUS	11 APR 96	17:00	12 APR 96
048293-0006-TB	TRIP BLANK	AQUEOUS	11 APR 96	16:25	12 APR 96
048293-0007-EB	EQUIPMENT RINSEATE	AQUEOUS	11 APR 96	17:10	12 APR 96

Quanterra Environmental Services

Metals
Dissolved Metals

Client Name: EPA L.V. Nevada
Client ID: WELL RU-03
Lab ID: 048293-0001-SA
Matrix: AQUEOUS
Authorized: 12 APR 96

Sampled: 11 APR 96
Prepared: See Below

Received: 12 APR 96
Analyzed: See Below

Parameter	Result	Qual	Dil	RL	Units	Test Method	Prepared Date	Analyzed Date
Arsenic	ND		1.0	0.017	mg/L	6010	NA	23 APR 96
Barium	0.12		1.0	0.010	mg/L	6010	NA	22 APR 96
Cadmium	ND		1.0	0.0050	mg/L	6010	NA	22 APR 96
Chromium	ND		1.0	0.010	mg/L	6010	NA	22 APR 96
Lead	0.0056		1.0	0.0030	mg/L	6010	NA	23 APR 96
Selenium	0.016		1.0	0.0050	mg/L	6010	NA	23 APR 96
Silver	ND		1.0	0.010	mg/L	6010	NA	22 APR 96
Mercury	ND		1.0	0.00020	mg/L	7470	25 APR 96	25 APR 96

ND = Not Detected

Reported By: Adam Alban

Approved By: Richard Persichitte

Quanterra Environmental Services

Metals
Dissolved Metals

Client Name: EPA L.V. Nevada
Client ID: WELL RU-5
Lab ID: 048293-0005-SA
Matrix: AQUEOUS
Authorized: 12 APR 96

Sampled: 11 APR 96
Prepared: See Below

Received: 12 APR 96
Analyzed: See Below

Parameter	Result	Qual	Dil	RL	Units	Test Method	Prepared Date	Analyzed Date
Arsenic	ND		1.0	0.010	mg/L	6010	NA	23 APR 96
Barium	0.36		1.0	0.010	mg/L	6010	NA	22 APR 96
Cadmium	ND		1.0	0.0050	mg/L	6010	NA	22 APR 96
Chromium	0.024		1.0	0.010	mg/L	6010	NA	22 APR 96
Lead	0.013		1.0	0.0030	mg/L	6010	NA	23 APR 96
Selenium	0.0072		1.0	0.0050	mg/L	6010	NA	23 APR 96
Silver	ND		1.0	0.010	mg/L	6010	NA	22 APR 96
Mercury	ND		1.0	0.00020	mg/L	7470	25 APR 96	25 APR 96

ND = Not Detected

Reported By: Adam Alban

Approved By: Richard Persichitte

Quanterra Environmental Services

Metals
Dissolved Metals

Client Name: EPA L.V. Nevada
Client ID: WELL RU-6A
Lab ID: 048293-0002-SA
Matrix: AQUEOUS
Authorized: 12 APR 96

Sampled: 11 APR 96
Prepared: See Below

Received: 12 APR 96
Analyzed: See Below

Parameter	Result	Qual	Dil	RL	Units	Test Method	Prepared Date	Analyzed Date
Arsenic	ND		1.0	0.017	mg/L	6010	NA	23 APR 96
Barium	0.12		1.0	0.010	mg/L	6010	NA	22 APR 96
Cadmium	ND		1.0	0.0050	mg/L	6010	NA	22 APR 96
Chromium	ND		1.0	0.010	mg/L	6010	NA	22 APR 96
Lead	ND		1.0	0.0030	mg/L	6010	NA	23 APR 96
Selenium	0.012		1.0	0.0050	mg/L	6010	NA	23 APR 96
Silver	ND		1.0	0.010	mg/L	6010	NA	22 APR 96
Mercury	ND		1.0	0.00020	mg/L	7470	25 APR 96	25 APR 96

ND = Not Detected

Reported By: Adam Alban

Approved By: Richard Persichitte

Quanterra Environmental Services

Metals
Dissolved Metals

Client Name:	EPA L.V. Nevada		
Client ID:	WELL RU-4A		
Lab ID:	048293-0003-SA		
Matrix:	AQUEOUS	Sampled: 11 APR 96	Received: 12 APR 96
Authorized:	12 APR 96	Prepared: See Below	Analyzed: See Below

Parameter	Result	Qual	Dil	RL	Units	Test Method	Prepared Date	Analyzed Date
Arsenic	ND		1.0	0.018	mg/L	6010	NA	23 APR 96
Barium	0.12		1.0	0.010	mg/L	6010	NA	22 APR 96
Cadmium	ND		1.0	0.0050	mg/L	6010	NA	22 APR 96
Chromium	ND		1.0	0.010	mg/L	6010	NA	22 APR 96
Lead	ND		1.0	0.0030	mg/L	6010	NA	23 APR 96
Selenium	0.015		1.0	0.0050	mg/L	6010	NA	23 APR 96
Silver	ND		1.0	0.010	mg/L	6010	NA	22 APR 96
Mercury	ND		1.0	0.00020	mg/L	7470	25 APR 96	25 APR 96

ND = Not Detected

Reported By: Adam Alban

Approved By: Richard Persichitte

Quanterra Environmental Services

Metals
Dissolved Metals

Client Name: EPA L.V. Nevada
Client ID: WELL RU-8
Lab ID: 048293-0004-SA
Matrix: AQUEOUS
Authorized: 12 APR 96

Sampled: 11 APR 96
Prepared: See Below

Received: 12 APR 96
Analyzed: See Below

Parameter	Result	Qual	Dil	RL	Units	Test Method	Prepared Date	Analyzed Date
Arsenic	ND		1.0	0.011	mg/L	6010	NA	23 APR 96
Barium	0.35		1.0	0.010	mg/L	6010	NA	22 APR 96
Cadmium	ND		1.0	0.0050	mg/L	6010	NA	22 APR 96
Chromium	ND		1.0	0.010	mg/L	6010	NA	22 APR 96
Lead	0.012		1.0	0.0030	mg/L	6010	NA	23 APR 96
Selenium	0.012		1.0	0.0050	mg/L	6010	NA	23 APR 96
Silver	ND		1.0	0.010	mg/L	6010	NA	22 APR 96
Mercury	ND		1.0	0.00020	mg/L	7470	25 APR 96	25 APR 96

ND = Not Detected

Reported By: Adam Alban

Approved By: Richard Persichitte

Gasoline Range Organics and Selected Components
Method API GRO

Quanterra Environmental Services

Client Name: EPA L.V. Nevada
Client ID: WELL RU-03
Lab ID: 048293-0001-SA
Matrix AQUEOUS
Authorized: 12 APR 96

Sampled: 11 APR 96
Received: 12 APR 96

Prepared: NA
Analyzed: 16 APR 96

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	0.50
Gasoline Range Organics	ND	ug/L	10
Surrogate	**Recovery**		**Limits**
a,a,a-Trifluorotoluene	104	%	75-125

Dilution factor is 1.0. All results and limits are corrected for dilution.

ND = Not Detected

Reported By: Tina Carroll

Approved By: Audrey Cornell

Gasoline Range Organics and Selected Components
Method API GRO

Quanterra Environmental Services

Client Name: EPA L.V. Nevada
Client ID: WELL RU-6A
Lab ID: 048293-0002-SA
Matrix AQUEOUS
Authorized: 12 APR 96

Sampled: 11 APR 96
Received: 12 APR 96

Prepared: NA
Analyzed: 16 APR 96

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	0.50
Gasoline Range Organics	ND	ug/L	10
Surrogate	**Recovery**		**Limits**
a,a,a-Trifluorotoluene	104	%	75-125

Dilution factor is 1.0. All results and limits are corrected for dilution.

ND = Not Detected

Reported By: Tina Carroll

Approved By: Audrey Cornell

Gasoline Range Organics and Selected Components
Method API GRO

Quanterra Environmental Services

Client Name: EPA L.V. Nevada
Client ID: WELL RU-5
Lab ID: 048293-0005-SA
Matrix AQUEOUS
Authorized: 12 APR 96

Sampled: 11 APR 96
Received: 12 APR 96

Prepared: NA
Analyzed: 16 APR 96

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	0.50
Gasoline Range Organics	ND	ug/L	10
Surrogate	**Recovery**		**Limits**
a,a,a-Trifluorotoluene	104	%	75-125

Dilution factor is 1.0. All results and limits are corrected for dilution.

ND = Not Detected

Reported By: Tina Carroll

Approved By: Audrey Cornell

Gasoline Range Organics and Selected Components
Method API GRO

Quanterra Environmental Services

Client Name: EPA L.V. Nevada
Client ID: WELL RU-4A
Lab ID: 048293-0003-SA
Matrix AQUEOUS
Authorized: 12 APR 96

Sampled: 11 APR 96
Received: 12 APR 96

Prepared: NA
Analyzed: 16 APR 96

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	0.50
Gasoline Range Organics	ND	ug/L	10
Surrogate	Recovery		Limits
a,a,a-Trifluorotoluene	105	%	75-125

Dilution factor is 1.0. All results and limits are corrected for dilution.

ND = Not Detected

Reported By: Tina Carroll

Approved By: Audrey Cornell

Gasoline Range Organics and Selected Components
Method API GRO

Quanterra Environmental Services

Client Name: EPA L.V. Nevada
Client ID: WELL RU-8
Lab ID: 048293-0004-SA
Matrix AQUEOUS
Authorized: 12 APR 96

Sampled: 11 APR 96
Received: 12 APR 96

Prepared: NA
Analyzed: 16 APR 96

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	0.50
Gasoline Range Organics	ND	ug/L	10
Surrogate	Recovery		Limits
a,a,a-Trifluorotoluene	104	%	75-125

Dilution factor is 1.0. All results and limits are corrected for dilution.

ND = Not Detected

Reported By: Tina Carroll

Approved By: Audrey Cornell

F-3 Second Quarter 1996 Analytical Results

Quanterra
Environmental
Services

EXECUTIVE SUMMARY

FOR

ENVIRONMENTAL PROTECTION AGENCY - LAS VEGAS

QUANTERRA NO. 049429

JUNE 20, 1996

Prepared by: Lisa L. Anderson

Reviewed by: Ellen LaRiviere

I. OVERVIEW

On June 6, 1996, Quanterra Environmental Services, Denver received seven aqueous samples from the Environmental Protection Agency - Las Vegas.

This report presents the analytical results as well as supporting information to aid in the evaluation and interpretation of the data and is arranged in the following order:

Overview
Sample Description Information/Analytical Test Requests
Analytical Results
Quality Control Report

Metals

Samples 049429-0001 through -0006 were analyzed for dissolved metals by Method 6010 and for dissolved mercury by Method 7470.

The samples were preserved in the field and filtered in the laboratory prior to analysis. The results for these samples may be biased high due to potential metals leaching from particulate matter present in the samples.

Reporting limits were raised for Arsenic by Trace-ICP for samples 049429-0001, and -0003 through -0005 due to matrix interference (no dilution required).

Percent recoveries for dissolved Selenium and Thallium were above historical control limits in the Matrix Spike/Matrix Spike Duplicate (MS/MSD). Because these metals were within control limits in the Duplicate Control Samples (DCSs), no further action was required.

With the exceptions listed above or on the data sheets, standard analytical protocols were followed in the analyses of the samples and no problems were encountered or anomalies observed. All laboratory QC samples analyzed in conjunction with the samples in this project were within established control limits.

Quanterra Environmental Services

Metals

Samples 048293-0001 through -0005, and -0006 were analyzed for dissolved metals by Method 6010 and for dissolved mercury by Method 7470.

Reporting limits were raised for Arsenic by Trace-ICP for samples 048293-0001 through -0004 due to matrix interference.

With the exceptions listed above or on the data sheets, standard analytical protocols were followed in the analyses of the samples and no problems were encountered or anomalies observed. All laboratory QC samples analyzed in conjunction with the samples in this project were within established control limits.

Quanterra Environmental Services

SAMPLE DESCRIPTION INFORMATION
for
EPA L.V. Nevada

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
049429-0001-SA	RU-3 WELL	AQUEOUS	05 JUN 96	09:00	06 JUN 96
049429-0002-SA	RU-5 WELL	AQUEOUS	05 JUN 96	10:30	06 JUN 96
049429-0002-MS	MS/MSD	AQUEOUS	05 JUN 96	10:45	06 JUN 96
049429-0002-SD	MS/MSD	AQUEOUS	05 JUN 96	10:45	06 JUN 96
049429-0003-SA	RU-6A WELL	AQUEOUS	05 JUN 96	09:30	06 JUN 96
049429-0004-SA	RU-8 WELL	AQUEOUS	05 JUN 96	10:00	06 JUN 96
049429-0005-SA	RU-6A(DUP)	AQUEOUS	05 JUN 96	09:45	06 JUN 96
049429-0006-SA	RINSATE SAMPLE	AQUEOUS	05 JUN 96	11:00	06 JUN 96
049429-0007-TB	TRIP BLANK	AQUEOUS	05 JUN 96	11:00	06 JUN 96

Quanterra Environmental Services

Gasoline Range Organics and Selected Components
Method API GRO

Client Name:	EPA L.V. Nevada		
Client ID:	RU-3 WELL		
Lab ID:	049429-0001-SA		
Matrix	AQUEOUS	Sampled: 05 JUN 96	Prepared: NA
Authorized:	06 JUN 96	Received: 06 JUN 96	Analyzed: 10 JUN 96

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	0.50
Gasoline Range Organics	ND	ug/L	10
Surrogate	**Recovery**		**Limits**
a,a,a-Trifluorotoluene	103	%	75-125

Dilution factor is 1.0. All results and limits are corrected for dilution.

ND = Not Detected

Reported By: Corey Crooks

Approved By: Audrey Cornell

Extractable Petroleum Hydrocarbons
Method GC/FID

Quanterra Environmental Services

Client Name: EPA L.V. Nevada
Client ID: RU-3 WELL
Lab ID: 049429-0001-SA
Matrix: AQUEOUS
Authorized: 06 JUN 96

Sampled: 05 JUN 96
Received: 06 JUN 96

Prepared: 11 JUN 96
Analyzed: 13 JUN 96

Parameter	Result	Units	Reporting Limit
Diesel Range Organics	ND	mg/L	0.094
Surrogate	Recovery		Limits
o-Terphenyl	109	%	47-137

Dilution factor is 0.94. All results and limits are corrected for dilution.

ND = Not Detected

Reported By: Don Vieaux

Approved By: Karen Kuiken

Quanterra Environmental Services

Metals
Dissolved Metals

Client Name: EPA L.V. Nevada
Client ID: RU-3 WELL
Lab ID: 049429-0001-SA
Matrix: AQUEOUS
Authorized: 06 JUN 96

Sampled: 05 JUN 96
Prepared: See Below

Received: 06 JUN 96
Analyzed: See Below

Parameter	Result	Qual	Dil	RL	Units	Test Method	Prepared Date	Analyzed Date
Arsenic	ND		1.0	0.019	mg/L	6010	NA	12 JUN 96
Barium	0.11		1.0	0.010	mg/L	6010	NA	17 JUN 96
Cadmium	ND		1.0	0.0050	mg/L	6010	NA	17 JUN 96
Chromium	ND		1.0	0.010	mg/L	6010	NA	17 JUN 96
Lead	ND		1.0	0.0030	mg/L	6010	NA	12 JUN 96
Selenium	0.014		1.0	0.0050	mg/L	6010	NA	12 JUN 96
Silver	ND		1.0	0.010	mg/L	6010	NA	17 JUN 96
Mercury	ND		1.0	0.00020	mg/L	7470	17 JUN 96	18 JUN 96

ND = Not Detected

Reported By: Matt Hall

Approved By: Richard Persichitte

Quanterra Environmental Services

Gasoline Range Organics and Selected Components
Method API GRO

Client Name: EPA L.V. Nevada
Client ID: RU-5 WELL
Lab ID: 049429-0002-SA
Matrix AQUEOUS
Authorized: 06 JUN 96

Sampled: 05 JUN 96
Received: 06 JUN 96

Prepared: NA
Analyzed: 10 JUN 96

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	0.50
Gasoline Range Organics	ND	ug/L	10
Surrogate	**Recovery**		**Limits**
a,a,a-Trifluorotoluene	105	%	75-125

Dilution factor is 1.0. All results and limits are corrected for dilution.

ND = Not Detected

Reported By: Corey Crooks

Approved By: Audrey Cornell

Extractable Petroleum Hydrocarbons
Method GC/FID

Quanterra Environmental Services

Client Name: EPA L.V. Nevada
Client ID: RU-5 WELL
Lab ID: 049429-0002-SA
Matrix: AQUEOUS
Authorized: 06 JUN 96

Sampled: 05 JUN 96
Received: 06 JUN 96

Prepared: 11 JUN 96
Analyzed: 13 JUN 96

Parameter	Result	Units	Reporting Limit
Diesel Range Organics	ND	mg/L	0.094
Surrogate	Recovery		Limits
o-Terphenyl	103	%	47-137

Dilution factor is 0.94. All results and limits are corrected for dilution.

ND = Not Detected

Reported By: Don Vieaux

Approved By: Audrey Cornell

Quanterra
Environmental Services

Metals
Dissolved Metals

Client Name:	EPA L.V. Nevada		
Client ID:	RU-5 WELL		
Lab ID:	049429-0002-SA		
Matrix:	AQUEOUS	Sampled: 05 JUN 96	Received: 06 JUN 96
Authorized:	06 JUN 96	Prepared: See Below	Analyzed: See Below

Parameter	Result	Qual	Dil	RL	Units	Test Method	Prepared Date	Analyzed Date
Arsenic	ND		1.0	0.010	mg/L	6010	NA	12 JUN 96
Barium	0.12		1.0	0.010	mg/L	6010	NA	17 JUN 96
Cadmium	ND		1.0	0.0050	mg/L	6010	NA	17 JUN 96
Chromium	ND		1.0	0.010	mg/L	6010	NA	17 JUN 96
Lead	ND		1.0	0.0030	mg/L	6010	NA	12 JUN 96
Selenium	0.0060		1.0	0.0050	mg/L	6010	NA	12 JUN 96
Silver	ND		1.0	0.010	mg/L	6010	NA	17 JUN 96
Mercury	ND		1.0	0.00020	mg/L	7470	17 JUN 96	18 JUN 96

ND = Not Detected

Reported By: Matt Hall

Approved By: Richard Persichitte

Quanterra Environmental Services

Gasoline Range Organics and Selected Components
Method API GRO

Client Name: EPA L.V. Nevada
Client ID: RU-6A WELL
Lab ID: 049429-0003-SA
Matrix AQUEOUS
Authorized: 06 JUN 96

Sampled: 05 JUN 96
Received: 06 JUN 96

Prepared: NA
Analyzed: 10 JUN 96

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	0.50
Gasoline Range Organics	ND	ug/L	10
Surrogate	**Recovery**		**Limits**
a,a,a-Trifluorotoluene	104	%	75-125

Dilution factor is 1.0. All results and limits are corrected for dilution.

ND = Not Detected

Reported By: Corey Crooks

Approved By: Audrey Cornell

Quanterra Environmental Services

Extractable Petroleum Hydrocarbons
Method GC/FID

Client Name: EPA L.V. Nevada
Client ID: RU-6A WELL
Lab ID: 049429-0003-SA
Matrix: AQUEOUS
Authorized: 06 JUN 96

Sampled: 05 JUN 96
Received: 06 JUN 96

Prepared: 11 JUN 96
Analyzed: 13 JUN 96

Parameter	Result	Units	Reporting Limit	
Diesel Range Organics	0.071	mg/L	0.094	J
Surrogate	Recovery		Limits	
o-Terphenyl	112	%	47-137	

Dilution factor is 0.94. All results and limits are corrected for dilution.

J = Result is detected below the reporting limit or is an estimated concentration.

Reported By: Don Vieaux

Approved By: Karen Kuiken

Quanterra Environmental Services

Metals
Dissolved Metals

Client Name:	EPA L.V. Nevada			
Client ID:	RU-6A WELL			
Lab ID:	049429-0003-SA			
Matrix:	AQUEOUS	Sampled: 05 JUN 96		Received: 06 JUN 96
Authorized:	06 JUN 96	Prepared: See Below		Analyzed: See Below

Parameter	Result	Qual	Dil	RL	Units	Test Method	Prepared Date	Analyzed Date
Arsenic	ND		1.0	0.024	mg/L	6010	NA	12 JUN 96
Barium	0.12		1.0	0.010	mg/L	6010	NA	17 JUN 96
Cadmium	ND		1.0	0.0050	mg/L	6010	NA	17 JUN 96
Chromium	ND		1.0	0.010	mg/L	6010	NA	17 JUN 96
Lead	ND		1.0	0.0030	mg/L	6010	NA	12 JUN 96
Selenium	0.020		1.0	0.0050	mg/L	6010	NA	12 JUN 96
Silver	ND		1.0	0.010	mg/L	6010	NA	17 JUN 96
Mercury	ND		1.0	0.00020	mg/L	7470	17 JUN 96	18 JUN 96

ND = Not Detected

Reported By: Matt Hall

Approved By: Richard Persichitte

Quanterra Environmental Services

Gasoline Range Organics and Selected Components
Method API GRO

Client Name: EPA L.V. Nevada
Client ID: RU-6A(DUP)
Lab ID: 049429-0005-SA
Matrix AQUEOUS
Authorized: 06 JUN 96

Sampled: 05 JUN 96
Received: 06 JUN 96

Prepared: NA
Analyzed: 10 JUN 96

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	0.50
Gasoline Range Organics	ND	ug/L	10
Surrogate	**Recovery**		**Limits**
a,a,a-Trifluorotoluene	103	%	75-125

Dilution factor is 1.0. All results and limits are corrected for dilution.

ND = Not Detected

Reported By: Corey Crooks

Approved By: Audrey Cornell

Extractable Petroleum Hydrocarbons
Method GC/FID

Quanterra Environmental Services

Client Name: EPA L.V. Nevada
Client ID: RU-6A(DUP)
Lab ID: 049429-0005-SA
Matrix: AQUEOUS
Authorized: 06 JUN 96

Sampled: 05 JUN 96
Received: 06 JUN 96

Prepared: 11 JUN 96
Analyzed: 13 JUN 96

Parameter	Result	Units	Reporting Limit	
Diesel Range Organics	0.26	mg/L	0.094	ql
Surrogate	Recovery		Limits	
o-Terphenyl	96	%	47-137	

[redacted]

Dilution factor is 0.94. All results and limits are corrected for dilution.

1 = Sample resembles a hydrocarbon product occurring within the n-alkane range of C12-C28.
q = This sample has GC/FID characteristics for which reliable identification of a product could not be achieved.

Reported By: Don Vieaux

Approved By: Karen Kuiken

Metals
Dissolved Metals

Client Name:	EPA L.V. Nevada		
Client ID:	RU-6A(DUP)		
Lab ID:	049429-0005-SA		
Matrix:	AQUEOUS	Sampled: 05 JUN 96	Received: 06 JUN 96
Authorized:	06 JUN 96	Prepared: See Below	Analyzed: See Below

Parameter	Result	Qual	Dil	RL	Units	Test Method	Prepared Date	Analyzed Date
Arsenic	ND		1.0	0.027	mg/L	6010	NA	12 JUN 96
Barium	0.11		1.0	0.010	mg/L	6010	NA	17 JUN 96
Cadmium	ND		1.0	0.0050	mg/L	6010	NA	17 JUN 96
Chromium	ND		1.0	0.010	mg/L	6010	NA	17 JUN 96
Lead	ND		1.0	0.0030	mg/L	6010	NA	12 JUN 96
Selenium	0.018		1.0	0.0050	mg/L	6010	NA	12 JUN 96
Silver	ND		1.0	0.010	mg/L	6010	NA	17 JUN 96
Mercury	ND		1.0	0.00020	mg/L	7470	17 JUN 96	18 JUN 96

ND = Not Detected

Reported By: Matt Hall

Approved By: Richard Persichitte

Quanterra Environmental Services

Gasoline Range Organics and Selected Components
Method API GRO

Client Name: EPA L.V. Nevada
Client ID: RU-8 WELL
Lab ID: 049429-0004-SA
Matrix: AQUEOUS
Authorized: 06 JUN 96

Sampled: 05 JUN 96
Received: 06 JUN 96

Prepared: NA
Analyzed: 10 JUN 96

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	0.50
Gasoline Range Organics	ND	ug/L	10
Surrogate	**Recovery**		**Limits**
a,a,a-Trifluorotoluene	100	%	75-125

Dilution factor is 1.0. All results and limits are corrected for dilution.

ND = Not Detected

Reported By: Corey Crooks

Approved By: Audrey Cornell

Extractable Petroleum Hydrocarbons
Method GC/FID

Quanterra Environmental Services

Client Name: EPA L.V. Nevada
Client ID: RU-8 WELL
Lab ID: 049429-0004-SA
Matrix: AQUEOUS
Authorized: 06 JUN 96

Sampled: 05 JUN 96
Received: 06 JUN 96

Prepared: 11 JUN 96
Analyzed: 13 JUN 96

Parameter	Result	Units	Reporting Limit
Diesel Range Organics	ND	mg/L	0.094
Surrogate	Recovery		Limits
o-Terphenyl	88	%	47-137

Dilution factor is 0.94. All results and limits are corrected for dilution.

ND = Not Detected

Reported By: Don Vieaux

Approved By: Karen Kuiken

Quanterra
Environmental Services

Metals
Dissolved Metals

Client Name: EPA L.V. Nevada
Client ID: RU-8 WELL
Lab ID: 049429-0004-SA
Matrix: AQUEOUS
Authorized: 06 JUN 96

Sampled: 05 JUN 96
Prepared: See Below

Received: 06 JUN 96
Analyzed: See Below

Parameter	Result	Qual	Dil	RL	Units	Test Method	Prepared Date	Analyzed Date
Arsenic	ND		1.0	0.024	mg/L	6010	NA	12 JUN 96
Barium	0.14		1.0	0.010	mg/L	6010	NA	17 JUN 96
Cadmium	ND		1.0	0.0050	mg/L	6010	NA	17 JUN 96
Chromium	ND		1.0	0.010	mg/L	6010	NA	17 JUN 96
Lead	ND		1.0	0.0030	mg/L	6010	NA	12 JUN 96
Selenium	0.022		1.0	0.0050	mg/L	6010	NA	12 JUN 96
Silver	ND		1.0	0.010	mg/L	6010	NA	17 JUN 96
Mercury	ND		1.0	0.00020	mg/L	7470	17 JUN 96	18 JUN 96

ND = Not Detected

Reported By: Matt Hall

Approved By: Richard Persichitte

F-4 Third Quarter 1996 Analytical Results

Sample Number-Sample Location Crosswalk

Sample Number	Sample Location
RUGW0005	Well RU-03
RUGW0006	Well RU-06A
RUGW0007	Well RU-06A Duplicate

Quanterra Environmental Services

Quanterra Incorporated
13715 Rider Trail North
Earth City, Missouri 63045

314 298-8566 Telephone
314 298-8757 Fax

CERTIFICATE OF ANALYSIS

IT Las Vegas
4330 South Valley View
Suite 114
Las Vegas, NV 89103-4047

October 19, 1996

RECEIVED
OCT 22 1996
IT/LAS VEGAS

Attention: Mr. Kurt Schmidt

IT Las Vegas Project Number	: Rulison
Quanterra, St. Louis Project Number	: 317.43
SDG Number	: 12453
Date Received	: October 10, 1996
Number of Samples	: Nine (9)
Sample type	: Water

INTRODUCTION

The following samples from the Nevada Test Site were received at Quanterra, St. Louis for Metals, Gamma, Rad-Screen, Tritium, Total Petroleum Hydrocarbon (Diesel and Gasoline), Radium 226, Strontium 89/90, Total Dissolved Solids, Tritium, Total Suspended Solids, BTEX and Gross Alpha/Beta. Enclosed is the full data package. The radiochemistry will be transmitted at a later date when those items get completed neater the due date.

Reviewed and Approved

Allen M. Field
Quanterra Project Manager

October 19, 1996
IT Las Vegas Project Number : Project ~~Shoal~~ Rulison
Quanterra, St. Louis Project Number : ~~317.55~~ 317.43

The samples were labeled as follows:

CLIENT ID	LAB ID	Matrix
RUGW007	12453-001	Water
RUGW006	12453-002	Water
RUGW005	12453-003,DUP,MS,MSD	Water
RUGW001	12453-004	Water
RUGW002	12453-005	Water
RUGW003	12453-006	Water
RUGW009	12453-007	Water
RUGW004	12453-009	Water
RUSP0008	12453-010	Water

ANALYTICAL RESULTS/METHODOLOGY

The analytical results are presented in the enclosed Certificate of Analysis and EDD Disk. This report includes information on client identification numbers, lab identification numbers, preparation date, analysis date, results, units, and results for quality control samples.

The following table is a list of the analyses requested and the methods used for the above samples:

Analysis	Method
Metals	EPA method 7470/6010
Gamma Scan	EPA 901.1
Tritium	EPA 906.0
TPH (Diesel)	EPA 8015
Gross Alpha/Beta	EPA 900.0
BTEX	EPA 8020
Radium	EPA 903.1
Strontium 89/90	Std. Method 7500-Sr
Total Dissolved Solids	EPA method 160.1
Total Suspended Solids	EPA method 160.2

Quanterra
Environmental Services

October 19, 1996

Ah 6/30/98

IT Las Vegas Project Number : Project ~~Shoal~~ Rulison

Quanterra, St. Louis Project Number : ~~317.55~~ 317.43

Ah 6/30/98

QUALITY CONTROL

Method blanks and laboratory control samples were analyzed with the samples listed above for each parameter. A laboratory duplicate, matrix spike and matrix spike duplicate was performed on sample RUGW005.

NONCONFORMANCE

There were no nonconformances associated with the analysis of these samples.

COMMENTS

Login 12453 was received at a temperature of 3/2/2/2°C. Sample RUGW0010 was not received on COC 486075.

Analytical Notes

Metals

The nitric acid preserved samples were filtered and matrix matched with HCl to our normal ICAP standards matrix and analyzed without digestion. In addition a matrix spike was prepared by spiking a second aliquot of sample after filtration.

Total recoverable metals were digested by SW846 method 3005A and analyzed by SW846 method 6010A. The matrix spike recovery for iron in the total recoverable metals analysis was 30% and below the 80-120% criteria. In accordance with our SOW the associated iron data was flagged with an "N".

QUALIFIERS/DEFINITIONS

*	:	Values outside of QC limits.
B	:	Results were between the PQL and the IDL.
U	:	Results are less than the IDL.
J	:	An estimated value.
ND	:	Parameter was analyzed for but not detected.
UG/L	:	Micrograms per Liter.
MG/L	:	Milligrams per Liter.
pCi/L	:	Picocurries per liter.
NA	:	Not applicable.

Quanterra
Environmental
Services

October 19, 1996

IT Las Vegas Project Number	: Project ~~Shoal~~ Rulison
Quanterra, St. Louis Project Number	: ~~317.55~~ 317.43

%REC	: Percent Recovery.
DUP	: Duplicate.
QCBLK	: Laboratory Method Blank.
QCLCS	: Laboratory Control Sample.
Qual.	: Qualifier.
LCL	: Lower Control Limits.
UCL	: Upper Control Limits.
PQL	: Practical Quantitation Limit.
MDA	: Minimum Detectable Activity.

IT-Las Vegas
4330 S. Valley View Boulevard
Suite 114
Las Vegas, NV 89103

Project: 317.43

Category: TPH
Method: EPA 8015
Matrix: Water

Client ID: RUGW0005

Sample Date : 10/08/96
Receipt Date : 10/10/96
Report Date : 10/18/96

Quanterra ID : 12453-003

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dilution
Diesel	68334-30-5	QCBLK116937-1	10/15/96	10/18/96	0.50	mg/L	U	0.50	1
C-40	14762-74-4	QCBLK116937-1	10/15/96	10/18/96	65	%REC			1

2/12/97 Revision 3

IT-Las Vegas
4330 S. Valley View Boulevard
Suite 114
Las Vegas, NV 89103

Project: 317.43

Category: TPH
Method: EPA 8015
Matrix: Water

Client ID: RUGW0006

Sample Date : 10/09/96
Receipt Date : 10/10/96
Report Date : 10/18/96

Quanterra ID : 12453-002

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dilution
Diesel	68334-30-5	QCBLK116937-1	10/15/96	10/18/96	0.50	mg/L	U	0.50	1
C-40	14762-74-4	QCBLK116937-1	10/15/96	10/18/96	76	%REC			1

2/12/97 Revision 3

IT-Las Vegas
4330 S. Valley View Boulevard
Suite 114
Las Vegas, NV 89103

Project: 317.43

Category: TPH
Method: EPA 8015
Matrix: Water

Client ID: RUGW0007

Sample Date : 10/09/96
Receipt Date : 10/10/96
Report Date : 10/18/96

Quanterra ID : 12453-001

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dilution
Diesel	68334-30-5	QCBLK116937-1	10/15/96	10/18/96	0.50	mg/L	U	0.50	1
C-40	14762-74-4	QCBLK116937-1	10/15/96	10/18/96	84	%REC			1

2/12/97 Revision 3

IT-Las Vegas
4330 S. Valley View Boulevard
Suite 114
Las Vegas, NV 89103

Project: 317.43

Category: BTEX
Method: EPA 8020
Matrix: Water

Client ID: RUGW0005

Sample Date : 10/08/96
Receipt Date : 10/10/96
Report Date : 11/13/96

Quanterra ID : 12453-003

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dilution
Benzene	71-43-2	QCBLK117481-1	10/17/96	10/17/96	1.0	ug/L	U	1.0	1
Toluene	108-88-3	QCBLK117481-1	10/17/96	10/17/96	1.0	ug/L	U	1.0	1
EthylBenzene	100-41-4	QCBLK117481-1	10/17/96	10/17/96	1.0	ug/L	U	1.0	1
m-,p-Xylene	136777-61-2	QCBLK117481-1	10/17/96	10/17/96	1.0	ug/L	U	1.0	1
o-Xylene	95-47-6	QCBLK117481-1	10/17/96	10/17/96	1.0	ug/L	U	1.0	1
Bromofluorobenzene (SURR)	460-00-4	QCBLK117481-1	10/17/96	10/17/96	100	%REC			1

IT-Las Vegas
4330 S. Valley View Boulevard
Suite 114
Las Vegas, NV 89103

Project: 317.43

Category: BTEX
Method: EPA 8020
Matrix: Water

Client ID: RUGW0006

Sample Date : 10/09/96
Receipt Date : 10/10/96
Report Date : 11/13/96

Quanterra ID : 12453-002

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dilution
Benzene	71-43-2	QCBLK117481-1	10/17/96	10/17/96	1.0	ug/L	U	1.0	1
Toluene	108-88-3	QCBLK117481-1	10/17/96	10/17/96	1.0	ug/L	U	1.0	1
EthylBenzene	100-41-4	QCBLK117481-1	10/17/96	10/17/96	1.0	ug/L	U	1.0	1
m-,p-Xylene	136777-61-2	QCBLK117481-1	10/17/96	10/17/96	1.0	ug/L	U	1.0	1
o-Xylene	95-47-6	QCBLK117481-1	10/17/96	10/17/96	1.0	ug/L	U	1.0	1
Bromofluorobenzene (SURR)	460-00-4	QCBLK117481-1	10/17/96	10/17/96	104	%REC			1

2/12/97 Revision 3

IT-Las Vegas
4330 S. Valley View Boulevard
Suite 114
Las Vegas, NV 89103

Project: 317.43

Category: BTEX
Method: EPA 8020
Matrix: Water

Client ID: RUGW0007

Sample Date : 10/09/96
Receipt Date : 10/10/96
Report Date : 11/13/96

Quanterra ID : 12453-001

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dilution
Benzene	71-43-2	QCBLK117481-1	10/17/96	10/17/96	1.0	ug/L	U	1.0	1
Toluene	108-88-3	QCBLK117481-1	10/17/96	10/17/96	1.0	ug/L	U	1.0	1
EthylBenzene	100-41-4	QCBLK117481-1	10/17/96	10/17/96	1.0	ug/L	U	1.0	1
m-,p-Xylene	136777-61-2	QCBLK117481-1	10/17/96	10/17/96	1.0	ug/L	U	1.0	1
o-Xylene	95-47-6	QCBLK117481-1	10/17/96	10/17/96	1.0	ug/L	U	1.0	1
Bromofluorobenzene (SURR)	460-00-4	QCBLK117481-1	10/17/96	10/17/96	110	%REC			1

IT-Las Vegas
4330 S. Valley View Boulevard
Suite 114
Las Vegas, NV 89103

Project: 317.43

Category: ICAP Metals
Method: EPA 6010
Matrix: Water

Client ID: RUGW0005

Sample Date : 10/08/96
Receipt Date : 10/10/96
Report Date : 10/19/96

Quanterra ID : 12453-003

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dilution
Arsenic	7440-38-2	QCBLK116737-1	10/12/96	10/12/96	3.2	ug/L	B	10.0	1
Barium	7440-39-3	QCBLK116737-1	10/12/96	10/12/96	105	ug/L	B	200	1
Cadmium	7440-43-9	QCBLK116737-1	10/12/96	10/12/96	0.60	ug/L	U	5.0	1
Chromium	7440-47-3	QCBLK116737-1	10/12/96	10/12/96	1.5	ug/L	U	10.0	1
Lead	7439-92-1	QCBLK116737-1	10/12/96	10/12/96	1.5	ug/L	B	3.0	1
Selenium	7782-49-2	QCBLK116737-1	10/12/96	10/12/96	2.8	ug/L	U	5.0	1
Silver	7440-22-4	QCBLK116737-1	10/12/96	10/12/96	1.5	ug/L	U	10.0	1

IT-Las Vegas
4330 S. Valley View Boulevard
Suite 114
Las Vegas, NV 89103

Project: 317.43

Category: ICAP Metals
Method: EPA 6010
Matrix: Water

Client ID: RUGW0006

Sample Date : 10/09/96
Receipt Date : 10/10/96
Report Date : 10/19/96

Quanterra ID : 12453-002

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dilution
Arsenic	7440-38-2	QCBLK116737-1	10/12/96	10/12/96	6.7	ug/L	B	10.0	1
Barium	7440-39-3	QCBLK116737-1	10/12/96	10/12/96	119	ug/L	B	200	1
Cadmium	7440-43-9	QCBLK116737-1	10/12/96	10/12/96	0.60	ug/L	U	5.0	1
Chromium	7440-47-3	QCBLK116737-1	10/12/96	10/12/96	1.5	ug/L	U	10.0	1
Lead	7439-92-1	QCBLK116737-1	10/12/96	10/12/96	0.80	ug/L	U	3.0	1
Selenium	7782-49-2	QCBLK116737-1	10/12/96	10/12/96	2.8	ug/L	U	5.0	1
Silver	7440-22-4	QCBLK116737-1	10/12/96	10/12/96	1.5	ug/L	U	10.0	1

IT-Las Vegas
4330 S. Valley View Boulevard
Suite 114
Las Vegas, NV 89103

Project: 317.43

Category: ICAP Metals
Method: EPA 6010
Matrix: Water

Client ID: RUGW0007

Sample Date : 10/09/96
Receipt Date : 10/10/96
Report Date : 10/19/96

Quanterra ID : 12453-001

Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dilution
Arsenic	7440-38-2	QCBLK116737-1	10/12/96	10/12/96	3.8	ug/L	B	10.0	1
Barium	7440-39-3	QCBLK116737-1	10/12/96	10/12/96	118	ug/L	B	200	1
Cadmium	7440-43-9	QCBLK116737-1	10/12/96	10/12/96	0.60	ug/L	U	5.0	1
Chromium	7440-47-3	QCBLK116737-1	10/12/96	10/12/96	1.5	ug/L	U	10.0	1
Lead	7439-92-1	QCBLK116737-1	10/12/96	10/12/96	1.2	ug/L	B	3.0	1
Selenium	7782-49-2	QCBLK116737-1	10/12/96	10/12/96	2.8	ug/L	U	5.0	1
Silver	7440-22-4	QCBLK116737-1	10/12/96	10/12/96	1.5	ug/L	U	10.0	1

IT-Las Vegas
4330 S. Valley View Boulevard
Suite 114
Las Vegas, NV 89103

Project: 317.43

Category: MERCURY
Method: EPA 7470
Matrix: Water

Sample Date : 10/09/96
Receipt Date : 10/10/96
Report Date : 10/17/96

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dil.
RUGW0007	12453-001	Mercury	7439-97-6	QCBLK116739-1	10/12/96	10/12/96	0.10	ug/L	U	0.20	1
RUGW0006	12453-002	Mercury	7439-97-6	QCBLK116739-1	10/12/96	10/12/96	0.10	ug/L	U	0.20	1
RUGW0005	12453-003	Mercury	7439-97-6	QCBLK116739-1	10/12/96	10/12/96	0.10	ug/L	U	0.20	1
RUGW0005DUP	12453-003DUP	Mercury	7439-97-6	QCBLK116739-1	10/12/96	10/12/96	0.10	ug/L	U	0.20	1
RUGW0005MS	12453-003MS	Mercury	7439-97-6	QCBLK116739-1	10/12/96	10/12/96	82	%REC			1
RUGW0001	12453-004	Mercury	7439-97-6	QCBLK116739-1	10/12/96	10/12/96	0.10	ug/L	U	0.20	1
RUGW0002	12453-005	Mercury	7439-97-6	QCBLK116739-1	10/12/96	10/12/96	0.10	ug/L	U	0.20	1
RUGW0003	12453-006	Mercury	7439-97-6	QCBLK116739-1	10/12/96	10/12/96	0.10	ug/L	U	0.20	1
QCLCS116739-1	QCLCS116739-1	Mercury	7439-97-6	QCBLK116739-1	10/12/96	10/12/96	97	%REC			1
QCBLK116739-1	QCBLK116739-1	Mercury	7439-97-6	QCBLK116739-1	10/12/96	10/12/96	-0.13	ug/L	B	0.20	1

IT-Las Vegas
4330 S. Valley View Boulevard
Suite 114
Las Vegas, NV 89103

Project: 317.43

Category: TSS
Method: EPA 160.2
Matrix: Water

Sample Date : 10/09/96
Receipt Date : 10/10/96
Report Date : 10/17/96

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Di..
RUGW0007	12453-001	Total Suspended	C-009	QCBLK116636-1	10/11/96	10/11/96	11.0	mg/L		1.00	[illegible]
RUGW0006	12453-002	Total Suspended	C-009	QCBLK116636-1	10/11/96	10/11/96	8.0	mg/L		1.00	1
RUGW0005	12453-003	Total Suspended	C-009	QCBLK116636-1	10/11/96	10/11/96	62.0	mg/L		1.00	1
RUGW0005	12453-003DUP	Total Suspended	C-009	QCBLK116636-1	10/11/96	10/11/96	67.0	mg/L		1.00	1
RUGW0001	12453-004	Total Suspended	C-009	QCBLK116636-1	10/11/96	10/11/96	1.00	mg/L	U	1.00	1
RUGW0002	12453-005	Total Suspended	C-009	QCBLK116636-1	10/11/96	10/11/96	14.0	mg/L		1.00	1
RUGW0003	12453-006	Total Suspended	C-009	QCBLK116636-1	10/11/96	10/11/96	12.0	mg/L		1.00	1
QCBLK116636-1	QCBLK116636-1	Total Suspended	C-009	QCBLK116636-1	10/11/96	10/11/96	1.00	mg/L	U	1.00	1
QCLCS116636-1	QCLCS116636-1	Total Suspended	C-009	QCBLK116636-1	10/11/96	10/11/96	94	%REC			1

2/12/97 Revision 3

IT-Las Vegas
4330 S. Valley View Boulevard
Suite 114
Las Vegas, NV 89103

Project: 317.43

Category: TDS
Method: EPA 160.1
Matrix: Water

Sample Date : 10/09/96
Receipt Date : 10/10/96
Report Date : 10/17/96

Client ID	Quanterra ID	Analyte	CAS Number	Blank Sample Name	Prep. Date	Analyses Date	Result	Unit	Qual.	Detection Limit	Dil
RUGW0007	12453-001	Total Dissolved	C-010	QCBLK116635-1	10/11/96	10/11/96	433	mg/L		5.00	[illegible]
RUGW0006	12453-002	Total Dissolved	C-010	QCBLK116635-1	10/11/96	10/11/96	445	mg/L		5.00	[illegible]
RUGW0005	12453-003	Total Dissolved	C-010	QCBLK116635-1	10/11/96	10/11/96	458	mg/L		5.00	[illegible]
RUGW0005	12453-003DUP	Total Dissolved	C-010	QCBLK116635-1	10/11/96	10/11/96	442	mg/L		5.00	[illegible]
RUGW0001	12453-004	Total Dissolved	C-010	QCBLK116635-1	10/11/96	10/11/96	453	mg/L		5.00	[illegible]
RUGW0002	12453-005	Total Dissolved	C-010	QCBLK116635-1	10/11/96	10/11/96	463	mg/L		5.00	[illegible]
RUGW0003	12453-006	Total Dissolved	C-010	QCBLK116635-1	10/11/96	10/11/96	452	mg/L		5.00	[illegible]
QCBLK116635-1	QCBLK116635-1	Total Dissolved	C-010	QCBLK116635-1	10/11/96	10/11/96	5.00	mg/L	U	5.00	1
QCLCS116635-1	QCLCS116635-1	Total Dissolved	C-010	QCBLK116635-1	10/11/96	10/11/96	105	%REC			1

2/12/97 Revision 3

F-5 Fourth Quarter 1996 Analytical Results

Quanterra
Environmental Services

Quanterra Incorporated
13715 Rider Trail North
Earth City, Missouri 63045

314 298-8566 Telephone
314 298-8757 Fax

CERTIFICATE OF ANALYSIS

IT Las Vegas
4330 South Valley View
Suite 114
Las Vegas, NV 89103-4047

December 23, 1996

Attention: Mr. Kurt Schmidt

IT Las Vegas Project Number	: Rulison
Quanterra, St. Louis Project Number	: 317.43
SDG Number	: 13038
Date Received	: December 5, 1996
Number of Samples	: Five (5)
Sample type	: Water

INTRODUCTION

The following samples from the Rulison Site were received at Quanterra, St. Louis for RCRA Metals, Rad-Screen, Total Petroleum Hydrocarbon (Diesel), Total Dissolved Solids, Total Suspended Solids, Potentially Dissolved Lead, Recoverable Iron, Chromium, Zinc and BTEX.

Reviewed and Approved

Allen M. Field

Allen M. Field
Quanterra Project Manager

December 23, 1996
IT Las Vegas Project Number : Rulison
Quanterra, St. Louis Project Number : 317.43

The samples were labeled as follows:

CLIENT ID	LAB ID	Matrix
RU-3#1	12453-001	Water
RU-3#2	12453-002,DUP,MS,MSD	Water
RU-6A	12453-003	Water
RU-6A#2	12453-004	Water
Trip Blank	12453-005	Water

ANALYTICAL RESULTS/METHODOLOGY

The analytical results are presented in the enclosed Certificate of Analysis and EDD Disk. This report includes information on client identification numbers, lab identification numbers, preparation date, analysis date, results, units, and results for quality control samples.

The following table is a list of the analyses requested and the methods used for the above samples:

Analysis	Method
Potentially Dissolved Lead	EPA 6010
RCRA Metals	EPA method 7470/6010
TPH (Diesel)	EPA 8015
BTEX	EPA 8020
Total Dissolved Solids	EPA method 160.1
Total Suspended Solids	EPA method 160.2
Total Recoverable Cr,Fe,Zn	EPA 3005/6010

QUALITY CONTROL

Method blanks and laboratory control samples were analyzed with the samples listed above for each parameter. A laboratory duplicate, matrix spike and matrix spike duplicate was performed on sample RU-3#2.

NONCONFORMANCE

There were no nonconformances associated with the analysis of these samples.

December 23, 1996
IT Las Vegas Project Number : Rulison
Quanterra, St. Louis Project Number : 317.43

The samples were labeled as follows:

CLIENT ID	LAB ID	Matrix
RU-3#1	13038-001	Water
RU-3#2	13038-002,DUP,MS,MSD	Water
RU-6A	13038-003	Water
RU-6A#2	13038-004	Water
Trip Blank	13038-005	Water

ANALYTICAL RESULTS/METHODOLOGY

The analytical results are presented in the enclosed Certificate of Analysis and EDD Disk. This report includes information on client identification numbers, lab identification numbers, preparation date, analysis date, results, units, and results for quality control samples.

The following table is a list of the analyses requested and the methods used for the above samples:

Analysis	Method
Potentially Dissolved Lead	EPA 6010
RCRA Metals	EPA method 7470/6010
TPH (Diesel)	EPA 8015
BTEX	EPA 8020
Total Dissolved Solids	EPA method 160.1
Total Suspended Solids	EPA method 160.2
Total Recoverable Cr,Fe,Zn	EPA 3005/6010

QUALITY CONTROL

Method blanks and laboratory control samples were analyzed with the samples listed above for each parameter. A laboratory duplicate, matrix spike and matrix spike duplicate was performed on sample RU-3#2.

NONCONFORMANCE

There were no nonconformances associated with the analysis of these samples.

Quanterra
Environmental Services

December 23, 1996
IT Las Vegas Project Number : Rulison
Quanterra, St. Louis Project Number : 317.43

COMMENTS

Login 13038 was received at a temperature of 2°C.

Analytical Notes

No analytical notes associated with this login.

QUALIFIERS/DEFINITIONS

*	: Values outside of QC limits.
B	: Results were between the PQL and the IDL.
U	: Results are less than the IDL.
J	: An estimated value.
ND	: Parameter was analyzed for but not detected.
UG/L	: Micrograms per Liter.
MG/L	: Milligrams per Liter.
pCi/L	: Picocurries per liter.
NA	: Not applicable.
%REC	: Percent Recovery.
DUP	: Duplicate.
QCBLK	: Laboratory Method Blank.
QCLCS	: Laboratory Control Sample.
Qual.	: Qualifier.
LCL	: Lower Control Limits.
UCL	: Upper Control Limits.
PQL	: Practical Quantitation Limit.
MDA	: Minimum Detectable Activity.

1D
HBH ANALYSIS DATA SHEET

EPA SAMPLE NO.
RU-3#1

Lab Name: QUANTERRA MO Contract: 317.43

Lab Code: ITMO Case No.: ______ SAS No.: ______ SDG No.: 13038

Matrix : (soil/water) WATER Lab Sample ID: 13038-001

Sample wt/vol: 1000 (g/ml) ML Lab File ID: ______

Level: (low/med) LOW Date Sampled: 12-04-96

% Moisture: not dec. ______ dec. ______ Date Extracted: 12-11-96

Extraction:(SepF/Cont/Sonc/Shak) SEPF Date Analyzed: 12-17-96

GPC Cleanup: (Y/N) N pH: ______ Dilution Factor: 1.0

CAS NO.	Compound	CONCENTRATION UNITS: (mg/L or mg/Kg) mg/L	Q
	FUEL OIL #2	0.50	U

U: Concentration of analyte is less than the value given.

FORM I HBH

1D
HBH ANALYSIS DATA SHEET

EPA SAMPLE NO.
RU-3#2

Lab Name: QUANTERRA MO   Contract: 317.43

Lab Code: ITMO   Case No.: ______   SAS No.: ______   SDG No.: 13038

Matrix : (soil/water) WATER   Lab Sample ID: 13038-002

Sample wt/vol: 1000 (g/ml) ML   Lab File ID: ______

Level: (low/med) LOW   Date Sampled: 12-04-96

% Moisture: not dec. ______ dec. ______   Date Extracted: 12-11-96

Extraction:(SepF/Cont/Sonc/Shak) SEPF   Date Analyzed: 12-17-96

GPC Cleanup: (Y/N) N   pH: ______   Dilution Factor: 1.0

CAS NO.	Compound	CONCENTRATION UNITS: (mg/L or mg/Kg) mg/L	Q
	FUEL OIL #2	0.50	U

U: Concentration of analyte is less than the value given.

FORM I HBH

4/10/97 Revision 4

000010

1D
HBH ANALYSIS DATA SHEET

EPA SAMPLE NO.
RU-6A

Lab Name: QUANTERRA MO   Contract: 317.43

Lab Code: ITMO   Case No.: ______   SAS No.: ______   SDG No.: 13038

Matrix : (soil/water) WATER   Lab Sample ID: 13038-003

Sample wt/vol: 1000 (g/ml) ML   Lab File ID: ______

Level: (low/med) LOW   Date Sampled: 12-04-96

% Moisture: not dec. ______ dec. ______   Date Extracted: 12-11-96

Extraction: (SepF/Cont/Sonc/Shak) SEPF   Date Analyzed: 12-17-96

GPC Cleanup: (Y/N) N   pH: ______   Dilution Factor: 1.0

CAS NO.	Compound	CONCENTRATION UNITS: (mg/L or mg/Kg) mg/L	Q
	FUEL OIL #2	0.50	U

U: Concentration of analyte is less than the value given.

FORM I HBH

1D
HBH ANALYSIS DATA SHEET

EPA SAMPLE NO.
RU-6A#2

Lab Name: QUANTERRA MO　　Contract: 317.43

Lab Code: ITMO　Case No.: ______　SAS No.: ______　SDG No.: 13038

Matrix : (soil/water) WATER　　Lab Sample ID: 13038-004

Sample wt/vol: 1000 (g/ml) ML　　Lab File ID: ______

Level: (low/med) LOW　　Date Sampled: 12-04-96

% Moisture: not dec. ______ dec. ______　　Date Extracted: 12-11-96

Extraction:(SepF/Cont/Sonc/Shak) SEPF　　Date Analyzed: 12-17-96

GPC Cleanup: (Y/N) N　pH: ______　　Dilution Factor: 1.0

CAS NO.	Compound	CONCENTRATION UNITS: (mg/L or mg/Kg) mg/L	Q
	FUEL OIL #2	0.50	U

U: Concentration of analyte is less than the value given.

FORM I HBH

4/10/97 Revision 4

1I
VOLATILE ORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.
RU-3#1

Lab Name: QUANTERRA,MO Contract: 317.43

Lab Code: ITMO Case No.: ______ SAS No.: ______ SDG No.: 13038

Matrix : (soil/water) WATER Lab Sample ID: 13038-001

Sample wt/vol: 25.0 (g/ml) ML Lab File ID: ______

Level: (low/med) LOW Date Sampled: 12-04-96

% Moisture: not dec. ______ Date Analyzed: 12-10-96

Column: (pack/cap) CAP Dilution Factor: 5.0

CONCENTRATION UNITS:
(UG/L or UG/KG) UG/L

CAS NO.	Compound	Concentration	Q
71-43-2	Benzene	1.0	U
108-88-3	Toluene	1.0	U
100-41-4	Ethylbenzene	1.0	U
1330-20-7	Xylenes (total)	1.0	U

U: Concentration of analyte is less than the value given.

FORM I 8020

1I

VOLATILE ORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

RU-3#2

Lab Name: QUANTERRA,MO   Contract: 317.43

Lab Code: ITMO   Case No.: ______   SAS No.: ______   SDG No.: 13038

Matrix : (soil/water) WATER   Lab Sample ID: 13038-002

Sample wt/vol: 25.0 (g/ml) ML   Lab File ID: ______

Level: (low/med) LOW   Date Sampled: 12-04-96

% Moisture: not dec. ______   Date Analyzed: 12-10-96

Column: (pack/cap) CAP   Dilution Factor: 5.0

CAS NO.	Compound	CONCENTRATION UNITS: (UG/L or UG/KG) UG/L	Q
71-43-2	Benzene	1.0	U
108-88-3	Toluene	1.0	U
100-41-4	Ethylbenzene	1.0	U
1330-20-7	Xylenes (total)	1.0	U

U: Concentration of analyte is less than the value given.

FORM I 8020

1I
VOLATILE ORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.
RU-6A

Lab Name: QUANTERRA,MO   Contract: 317.43

Lab Code: ITMO   Case No.: ______   SAS No.: ______   SDG No.: 13038

Matrix : (soil/water) WATER   Lab Sample ID: 13038-003

Sample wt/vol: 25.0 (g/ml) ML   Lab File ID: ______

Level: (low/med) LOW   Date Sampled: 12-04-96

% Moisture: not dec. ______   Date Analyzed: 12-10-96

Column: (pack/cap) CAP   Dilution Factor: 5.0

CAS NO.	Compound	CONCENTRATION UNITS: (UG/L or UG/KG) UG/L	Q
71-43-2	Benzene	1.0	U
108-88-3	Toluene	1.0	U
100-41-4	Ethylbenzene	1.0	U
1330-20-7	Xylenes (total)	1.0	U

U: Concentration of analyte is less than the value given.

FORM I 8020

1I

VOLATILE ORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

RU-6A#2

Lab Name: QUANTERRA,MO　　Contract: 317.43

Lab Code: ITMO　Case No.: ______　SAS No.: ______　SDG No.: 13038

Matrix : (soil/water) WATER　　Lab Sample ID: 13038-004

Sample wt/vol: 25.0 (g/ml) ML　　Lab File ID: ______

Level: (low/med) LOW　　Date Sampled: 12-04-96

% Moisture: not dec. ______　　Date Analyzed: 12-10-96

Column: (pack/cap) CAP　　Dilution Factor: 5.0

CAS NO.	Compound	CONCENTRATION UNITS: (UG/L or UG/KG) UG/L	Q
71-43-2	Benzene	1.0	U
108-88-3	Toluene	1.0	U
100-41-4	Ethylbenzene	1.0	U
1330-20-7	Xylenes (total)	1.0	U

U: Concentration of analyte is less than the value given.

FORM I 8020

4/10/97 Revision 4

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

RU-3#1

Lab Name: QUANTERRA_MO Contract: 317.43

Lab Code: ITMO Case No.: SAS No.: SDG No.: 13038

Matrix (soil/water): WATER Lab Sample ID: 13038-001

Level (low/med): LOW Date Received: 12/05/96

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	5.6	~~B~~	U	P
7440-39-3	Barium	135	~~B~~		P
7440-43-9	Cadmium	0.60	U		P
7440-47-3	Chromium	6.7	~~B~~		P
7439-92-1	Lead	2.3	~~B~~	U	P
7439-97-6	Mercury	0.10	U		CV
7782-49-2	Selenium	2.8	U		P
7440-22-4	Silver	1.5	U		P

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

SW-846

4/10/97 Revision 4

U.S. EPA - CLP

1
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

RU-3#2

Lab Name: QUANTERRA_MO Contract: 317.43
Lab Code: ITMO Case No.: SAS No.: SDG No.: 13038
Matrix (soil/water): WATER Lab Sample ID: 13038-002
Level (low/med): LOW Date Received: 12/05/96
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	3.0	~~B~~	U	P
7440-39-3	Barium	99.3	~~B~~		P
7440-43-9	Cadmium	0.60	U		P
7440-47-3	Chromium	2.2	~~B~~		P
7439-92-1	Lead	0.80	U		P
7439-97-6	Mercury	0.10	U		CV
7782-49-2	Selenium	2.8	U		P
7440-22-4	Silver	1.5	U		P

Color Before: Clarity Before: Texture:
Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

SW-846

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

RU-6A

Lab Name: QUANTERRA_MO Contract: 317.43

Lab Code: ITMO Case No.: SAS No.: SDG No.: 13038

Matrix (soil/water): WATER Lab Sample ID: 13038-003

Level (low/med): LOW Date Received: 12/05/96

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	3.2	~~B~~		P
7440-39-3	Barium	116	~~B~~		P
7440-43-9	Cadmium	0.60	U		P
7440-47-3	Chromium	1.5	U		P
7439-92-1	Lead	0.80	U		P
7439-97-6	Mercury	0.11	B		CV
7782-49-2	Selenium	2.8	U		P
7440-22-4	Silver	1.5	U		P

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

SW-846

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

RU-6A#2

Lab Name: QUANTERRA_MO Contract: 317.43
Lab Code: ITMO Case No.: SAS No.: SDG No.: 13038
Matrix (soil/water): WATER Lab Sample ID: 13038-004
Level (low/med): LOW Date Received: 12/05/96
% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	1.8	U		P
7440-39-3	Barium	126	~~B~~		P
7440-43-9	Cadmium	0.60	U		P
7440-47-3	Chromium	1.5	U		P
7439-92-1	Lead	0.80	U		P
7439-97-6	Mercury	0.10	U		CV
7782-49-2	Selenium	2.8	U		P
7440-22-4	Silver	1.5	U		P

Color Before: Clarity Before: Texture:
Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

SW-846

4/10/97 Revision 4

U00010

F-6 First Quarter 1997 Analytical Results

Subsidiary of SPL Incorporated

LAS Laboratories, Inc.

RECEIVED
APR 2 2 1997
IT/LAS VEGAS

IT INTERNATIONAL CORPORATION

ANALYTICAL DATA REPORT

FOR

TOTAL METALS, TOTAL RECOVERABLE METALS, POTENTIALLY DISSOLVED LEAD, TOTAL DISSOLVED SOLIDS, TOTAL SUSPENDED SOLIDS, VOLATILES, AND TOTAL PETROLEUM HYDROCARBONS

LOG-IN NUMBER	L9073
QUOTATION NUMBER	P701740
DOCUMENT FILE NUMBER	0329305

LAS LABORATORIES, INC. • 975 Kelly Johnson Drive • Las Vegas, Nevada 89119-3705
Telephone 702-361-0220 • Facsimile 702-361-8146

April 16, 1997

Mr. Kurt Schmidt
IT International Corporation
4330 S. Valley View, Suite 114
Las Vegas, NV 89103

RE: Log-in No. L9073
Quotation No. P701740
Document File No. 0329305

The attached data report contains the analytical results of samples that were submitted to LAS Laboratories, Inc. on 29 March 1997.

The temperatures of the two coolers upon receipt were 6 and 5°C. All sample containers coincided with the chain-of-custody documentation. All sample containers were received intact. Samples were received in time to meet the analytical holding time requirements. The following sample for volatile analysis contained headspace: RU0105. All discrepancies (if applicable) identified upon receipt of the samples have been forwarded to the client and are documented in the enclosed chain-of-custody records. (See attached Sample Receiving Checklist for details).

The case narratives included in the following attachments provide a detailed description of all events that occurred during sample preparation, analysis, and data review specific to the samples and analytical methods requested.

A list of data qualifiers, chain-of-custody forms, sample receiving checklist, and log-in report are also enclosed representing the samples received within this group.

If you have any questions concerning the analysis or the data please call Jenny Davis at (702) 361-3955, ext 213. If you are unable to contact the client services representative, please call Mary B. Ford, client services manager, at extension 326.

Release of this data report has been authorized by the Laboratory Director or the Director's designee as evidenced by the following signature.

Sincerely,

Jenny L. Davis

Jenny L. Davis
Client Services Representative

cc: Client Services
Document Control

LAS Laboratories, Inc.

CASE NARRATIVE
INORGANIC NON-METALS ANALYSES

The routine calibration and quality control analyses performed for this batch include as applicable: initial and continuing calibration verification, initial and continuing calibration blanks, method blank(s), laboratory control sample(s), matrix spike sample(s), and duplicate sample(s).

Preparation and Analysis Requirements

All samples were received on March 29, 1997. The samples were logged in as L9073 and prepared and analyzed in batch 329-IT for:

A. Method 160.2 Total Suspended Solids
B. Method 160.1 Total Dissolved Solids

Method Blanks

- The concentration levels of all the requested analytes in the method blank were below the reporting detection limits.

Holding Time Requirements

- All samples were analyzed within the method-specific holding times.

Internal Quality Control

- All Internal Quality Control were within acceptable limits.

M.B. Watson-Garrett
Prepared By

4/11/97
Date

CASE NARRATIVE
INORGANIC METALS ANALYSES
WATER

The routine calibration and quality control analyses performed for this batch include as applicable: instrument tune (ICP/MS only), initial and continuing calibration verification, initial and continuing calibration blanks, method blank(s), laboratory control sample(s), ICP interference check samples (ICP only), serial dilutions, analytical (post-digestion) spike samples, matrix spike (predigestion) sample(s), and duplicate sample(s).

Preparation and Analysis Requirements

- Four water samples for metals analysis. The samples were prepared and analyzed as LAS Batch 329IT and analyzed for selected analytes as requested on the chain-of-custody. Sample RU0101 (L9073-18) was used for matrix spike, duplicate, post-digestion spike and serial dilution analyses. All flags due to the performance of the above-mentioned QC sample are also associated with every sample digested with this batch.

Holding Time Requirements

- All samples were analyzed within the method-specific holding times.

Method Blanks

- The concentration levels of all the requested analytes in the method blank were below the reporting detection limits with the following exceptions:

- For arsenic, the final continuing calibration blank (CCB) recovered above the reporting detection limit. No corrective action was taken because all samples of interest were bracketed by acceptable CCBs therefore, sample results are not affected.

Internal Quality Control

All Internal Quality Control were within acceptance limits with the following exceptions:

- For arsenic, the final continuing calibration verification (CCV) recovered out of control limits. No corrective action was taken because all samples of interest were bracketed by acceptable CCVs therefore, sample data is not affected.

Sample Results

- All methods were performed according to ILM03.0. The following qualifiers are reported on the basis of the techniques employed to perform the analyses:

  "P" Trace ICPAES Method-6010A
  "AV" Cold Vapor AA Method-7470A

Nalini Prabhakar — 04/14/97

Prepared By — **Date**

CASE NARRATIVE
INORGANIC ANALYSES
TOTAL RECOVERABLE METALS

The routine calibration and quality control analyses performed for this batch include as applicable: instrument tune (ICP/MS only), initial and continuing calibration verification, initial and continuing calibration blanks, method blank(s), laboratory control sample(s), ICP interference check samples (ICP only), serial dilutions, analytical (post-digestion) spike samples, matrix spike (predigestion) sample(s) and duplicate sample(s).

Preparation and Analysis Requirements

- Four water samples for metals analysis. The samples were prepared and analyzed as LAS Batch 329IT2 and analyzed for selected analytes as requested on the chain-of-custody. Sample RU0101 (L9073-19) was used for matrix spike, duplicate, post-digestion spike and serial dilution analyses. All flags due to the performance of the above-mentioned QC sample are also associated with every sample digested with this batch.

Holding Time Requirements

- All samples were analyzed within the method-specific holding times.

Method Blanks

- The concentration levels of all the requested analytes in the method blank were below the reporting detection limits.

Internal Quality Control

All Internal Quality Control were within acceptance limits.

Sample Results

- All methods were performed according to ILM03.0. The following qualifiers are reported on the basis of the techniques employed to perform the analyses:

"P" ICPAES Method-6010A

Nalini Prabhakar — 04/14/97

Prepared By — **Date**

CASE NARRATIVE
INORGANIC METALS ANALYSES
POTENTIALLY DISSOLVED LEAD

The routine calibration and quality control analyses performed for this batch include as applicable: instrument tune (ICP/MS only), initial and continuing calibration verification, initial and continuing calibration blanks, method blank(s), laboratory control sample(s), ICP interference check samples (ICP only), serial dilutions, analytical (post-digestion) spike samples, matrix spike (predigestion) sample(s) and duplicate sample(s).

Preparation and Analysis Requirements

- Four water samples for lead analysis. The samples were prepared and analyzed as LAS Batch 329IT and analyzed for selected analytes as requested on the chain-of-custody. Sample RU0101 (L9073-18) was used for matrix spike, duplicate and matrix spike duplicate analyses. All flags due to the performance of the above-mentioned QC sample are also associated with every sample digested with this batch.

Holding Time Requirements

- All samples were analyzed within the method-specific holding times.

Method Blanks

- The concentration levels of all the requested analytes in the method blank were below the reporting detection limits.

Internal Quality Control

All Internal Quality Control were within acceptance limits.

Sample Results

- All methods were performed according to ILM03.0. The following qualifiers are reported on the basis of the techniques employed to perform the analyses:

"F" GFAA Method-7000

Nalini Prabhakar — 04/14/97

Prepared By — **Date**

CASE NARRATIVE
ORGANIC ANALYSES

Analytical Method 8020 Volatiles (BTEX)

Analytical Batch 033197-801020-O-1

Note: Sample RU0101 (L9073-1) was the native sample used for the matrix spike (L9073-1MS) and matrix spike duplicate (L9073-1MSD) analyzed in this analytical batch.

Low level system contaminations were detected in the samples analyzed in this analytical batch. However, it is believed that these values were due solely to the chromatographic system and are not present in the samples.

The associated samples were analyzed within holding time on April 1, 1997. All initial and continuing calibrations met criteria. Target compounds Benzene, Toluene, and o-Xylene were detected in the method blank (47040MB). All corresponding sample results were flagged accordingly. Compound recoveries were within QC limits in the L9073-1MS, L9073-1MSD, and laboratory control sample (47040LCS). The relative percent differences (RPDs) between the MS and MSD recoveries were within QC limits.

Analytical Method 8015M Total Petroleum Hydrocarbons (TPH)

The associated samples were extracted within holding time on March 31, 1997. The samples were analyzed in two analytical batches. All initial and continuing calibrations met criteria. The recovery of surrogate compound n-Octacosane was within QC limits for all samples.

Analytical Batch 040197-8015-D-1

Note: Sample RU0101 (L9073-38) was the native sample used for the 46939MS analyzed in this analytical batch. The MS was extracted and analyzed using the duplicate sample RU0101 (L9073-39). Due to insufficient sample volume, a MSD extraction was not performed. A 46939LCS and laboratory control sample duplicate (46939LCSDUP) were extracted and analyzed for precision data.

The samples were analyzed within holding time on April 1 and 2, 1997. Diesel Range Organics was not detected in the method blank (46939MB). The recovery of Diesel Range Organics was within QC limits in the 46939MS, 46939LCS, and 46939LCSDUP. The RPD between the LCS and LCSDUP recoveries was within QC limits.

Analytical Batch 040197-8015-D-2

Sample RU0104 (L9073-42) was analyzed within holding time on April 2, 1997. The associated 46939MB, 46939MS, 46939LCS, and 46939LCSDUP were analyzed in analytical batch 040197-8015-D-1.

Lydia M. Coleman
Prepared By

April 14, 1997
Date

Sample Number and Associated Well

Sample Number	Well Number
RU0101	RU-03
RU0102	RU-06A
RU0103	RU-06A (Duplicate)

LAS LABORATORIES

TOTAL PETROLEUM HYDROCARBONS (TPH)
8015M - TPH

Client Sample ID:	RU0101	LAS Sample ID:	L9073-38
Date Collected:	27-MAR-97	Date Received:	29-MAR-97
Date Analyzed:	02-APR-97	Analytical Batch ID:	040197-8015-D-1
Date Extracted:	31-MAR-97	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	1.0
		QC Group:	8015M - TPH_46939

SURROGATE	RECOVERY	QC Limits
N-OCTACOSANE	88%	26-152

CONSTITUENT	CAS NO.	RESULT mg/L	PQL mg/L	DATA QUALIFIER(S)
Diesel Range Organics	TPH	<1.0	1.0	

000057

TOTAL PETROLEUM HYDROCARBONS (TPH)
8015M - TPH

Client Sample ID:	RU0102	LAS Sample ID:	L9073-40
Date Collected:	27-MAR-97	Date Received:	29-MAR-97
Date Analyzed:	02-APR-97	Analytical Batch ID:	040197-8015-D-1
Date Extracted:	31-MAR-97	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	1.0
		QC Group:	8015M - TPH_46939

SURROGATE	RECOVERY	QC Limits
N-OCTACOSANE	71%	26-152

CONSTITUENT	CAS NO.	RESULT mg/L	PQL mg/L	DATA QUALIFIER(S)
Diesel Range Organics	TPH	<1.0	1.0	

000058

LAS LABORATORIES

TOTAL PETROLEUM HYDROCARBONS (TPH)
8015M - TPH

Client Sample ID:	RU0103	LAS Sample ID:	L9073-41
Date Collected:	27-MAR-97	Date Received:	29-MAR-97
Date Analyzed:	02-APR-97	Analytical Batch ID:	040197-8015-D-1
Date Extracted:	31-MAR-97	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	1.0
		QC Group:	8015M - TPH_46939

SURROGATE	RECOVERY	QC Limits
N-OCTACOSANE	108%	26-152

CONSTITUENT	CAS NO.	RESULT mg/L	PQL mg/L	DATA QUALIFIER(S)
Diesel Range Organics	TPH	<1.0	1.0	

000059

LAS LABORATORIES

PURGEABLE AROMATIC HYDROCARBONS BY GCPID
3020 VOLATILES

Client Sample ID:	RU0101	LAS Sample ID:	L9073-1
Date Collected:	27-MAR-97	Date Received:	29-MAR-97
Date Analyzed:	01-APR-97	Analytical Batch ID:	033197-801020-O-1
Date Extracted:	N/A	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	1.0

SURROGATE	RECOVERY	QC Limits
BFB	106%	70-120
TFT	102%	75-120

CONSTITUENT	CAS NO.	RESULT ug/L	PQL ug/L		DATA QUALIFIER(S)
Benzene	71-43-2	~~0.74~~	1.0	u	~~JB~~
Toluene	108-88-3	<1.0	1.0		
Ethylbenzene	100-41-4	<1.0	1.0		
m,p-Xylenes	136777-61-2	<1.0	1.0		
o-Xylene	95-47-6	~~0.58~~	1.0	u	~~JB~~

000001

LAS LABORATORIES

PURGEABLE AROMATIC HYDROCARBONS BY GCPID
8020 VOLATILES

Client Sample ID:	RU0102	LAS Sample ID:	L9073-7
Date Collected:	27-MAR-97	Date Received:	29-MAR-97
Date Analyzed:	01-APR-97	Analytical Batch ID:	033197-801020-O-1
Date Extracted:	N/A	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	1.0

SURROGATE	RECOVERY	QC Limits
BFB	109%	70-120
TFT	109%	75-120

CONSTITUENT	CAS NO.	RESULT ug/L	PQL ug/L	DATA QUALIFIER(S)
Benzene	71-43-2	0.~~87~~	1.0 U	~~JB~~
Toluene	108-88-3	0.~~35~~	1.0 U	~~JB~~
Ethylbenzene	100-41-4	<1.0	1.0	
m,p-Xylenes	136777-61-2	<1.0	1.0	
o-Xylene	95-47-6	0.~~58~~	1.0 U	~~JB~~

000002

LAS LABORATORIES

PURGEABLE AROMATIC HYDROCARBONS BY GCPID
8020 VOLATILES

Client Sample ID:	RU0103	LAL Sample ID:	L9073-10
Date Collected:	27-MAR-97	Date Received:	29-MAR-97
Date Analyzed:	01-APR-97	Analytical Batch ID:	033197-801020-O-1
Date Extracted:	N/A	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	1.0

SURROGATE	RECOVERY	QC Limits
BFB	109%	70-120
TFT	107%	75-120

CONSTITUENT	CAS NO.	RESULT ug/L	PQL ug/L	DATA QUALIFIER(S)
Benzene	71-43-2	~~0.70~~	1.0 U	~~JB~~
Toluene	108-88-3	~~0.49~~	1.0 U	~~JB~~
Ethylbenzene	100-41-4	<1.0	1.0	
m,p-Xylenes	136777-61-2	<1.0	1.0	
o-Xylene	95-47-6	~~0.47~~	1.0 U	~~JB~~

000003

CLP

1
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

RU0101

Lab Name: L.A.S Contract: IT_CORP.__

Lab Code: LOCK__ Case No.: 329IT_ SAS No.: ______ SDG No.: L9073W

Matrix (soil/water): WATER Lab Sample ID: L9073-18__

Level (low/med): LOW__ Date Received: 03/29/97

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	3.0	U		P
7440-39-3	Barium	86.0	~~B~~		P
7440-43-9	Cadmium	2.0	U		P
7440-47-3	Chromium	2.2	~~B~~		P
7439-92-1	Lead	2.0	U		P
7439-97-6	Mercury	0.20	U		AV
7782-49-2	Selenium	4.0	U		P
7440-22-4	Silver	2.0	U		P

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: ______

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: ______

Comments:

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CLP

1

INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

RU0102

b Name: L.A.S Contract: IT_CORP.__

Lab Code: LOCK__ Case No.: 329IT_ SAS No.: ______ SDG No.: L9073W

Matrix (soil/water): WATER Lab Sample ID: L9073-24__

Level (low/med): LOW__ Date Received: 03/29/97

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic__	3.7	~~B~~		P_
7440-39-3	Barium__	118	~~B~~		P_
7440-43-9	Cadmium__	2.0	U		P_
7440-47-3	Chromium_	2.5	~~B~~		P_
7439-92-1	Lead__	2.0	U		P_
7439-97-6	Mercury__	0.20	U		AV
7782-49-2	Selenium_	4.0	U		P_
7440-22-4	Silver__	2.0	U		P_

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: ______

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: ______

Comments:

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CLP

1
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

RU0123

Lab Name: L.A.S Contract: IT_CORP.__

Lab Code: LOCK__ Case No.: 329IT_ SAS No.: _______ SDG No.: L9073W

Matrix (soil/water): WATER Lab Sample ID: L9073-27__

Level (low/med): LOW__ Date Received: 03/29/97

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	3.6	~~B~~		P
7440-39-3	Barium	115	~~B~~		P
7440-43-9	Cadmium	2.0	U		P
7440-47-3	Chromium	1.7	~~B~~		P
7439-92-1	Lead	2.0	U		P
7439-97-6	Mercury	0.20	U		AV
7782-49-2	Selenium	4.0	U		P
7440-22-4	Silver	2.0	U		P

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: ______

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: ______

Comments:

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F-7 Second Quarter 1997 Analytical Results

A Subsidiary of SPL Incorporated

LAS Laboratories, Inc.

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ANALYTICAL DATA REPORT

FOR

TOTAL METALS, TOTAL RECOVERABLE METALS, POTENTIALLY DISSOLVED LEAD, TOTAL DISSOLVED SOLIDS, TOTAL SUSPENDED SOLIDS, TOTAL PETROLEUM HYDROCARBONS, AND 8020A

LOG-IN NUMBER	L9696
QUOTATION NUMBER	P701740
DOCUMENT FILE NUMBER	0614305

LAS LABORATORIES, INC. • 975 Kelly Johnson Drive • Las Vegas, Nevada 89119-3705
Telephone 702-361-0220 • Facsimile 702-361-8146

July 18, 1997

Mr. Kurt Schmidt
IT International Corporation
4330 S. Valley View, Suite 114
Las Vegas, NV 89103

RE:	**Log-in No.**	**L9696**
	Quotation No.	**P701740**
	Document File No.	**0614305**

The attached data report contains the analytical results of samples that were submitted to LAS Laboratories, Inc. on 14 June 1997. The temperatures of the four coolers upon receipt were 4, 4, 6, and 2°C. All sample containers coincided with the chain-of-custody documentation. All sample containers were received intact. Samples were received in time to meet the analytical holding time requirements. The following samples for volatile analysis contained headspace: RUW 00113 and RUW 00108. All discrepancies (if applicable) identified upon receipt of the samples have been forwarded to the client and are documented in the enclosed chain-of-custody records. (See attached Sample Receiving Checklist for details).

The case narratives included in the following attachments provide a detailed description of all events that occurred during sample preparation, analysis, and data review specific to the samples and analytical methods requested.

A list of data qualifiers, chain-of-custody forms, sample receiving checklist, and log-in report are also enclosed representing the samples received within this group.

If you have any questions concerning the analysis or the data please call Jenny Davis at (702) 361-3955, ext 213. If you are unable to contact the client services representative, please call Mary B. Ford, client services manager, at extension 326.

Release of this data report has been authorized by the Laboratory Director or the Director's designee as evidenced by the following signature.

Sincerely,

Jenny L. Davis

Jenny L. Davis
Client Services Representative

cc: Client Services
Document Control

LAS Laboratories, Inc.

Log-in No. L9696
Quotation No. P701740
Document File No. 0614305

CASE NARRATIVE
INORGANIC NON-METALS ANALYSES

The routine calibration and quality control analyses performed for this batch include as applicable: initial and continuing calibration verification, initial and continuing calibration blanks, method blank(s), laboratory control sample(s), matrix spike sample(s), and duplicate sample(s).

Preparation and Analysis Requirements

All samples were received on June 14, 1997. The samples were logged in as L9696 and prepared and analyzed in for:

A. Method 160.1 Total Dissolved Solids
B. Method 160.2 Total Suspended Solids

Method Blanks

- The concentration levels of all the requested analytes in the method blank were below the reporting detection limits.

Holding Time Requirements

- All samples were analyzed within the method-specific holding times.

Internal Quality Control

- All Internal Quality Control were within acceptable limits.

Nalini Prabhakar 06/27/97

CASE NARRATIVE
INORGANIC METALS ANALYSES
WATER

The routine calibration and quality control analyses performed for this batch include as applicable: instrument tune (ICP/MS only), initial and continuing calibration verification, initial and continuing calibration blanks, method blank(s), laboratory control sample(s), ICP interference check samples (ICP only), serial dilutions, analytical (post-digestion) spike samples, matrix spike (predigestion) sample(s), and duplicate sample(s).

Preparation and Analysis Requirements

- Seven water sample for metals analysis. The samples were prepared and analyzed as LAS Batch 614IT and analyzed for selected analytes as requested on the chain-of-custody. Sample RUW-00106 (L9696-43) was used for matrix spike and duplicate, serial dilution and post-digestion spike analyses. All flags due to the performance of the above-mentioned QC sample are also associated with every sample digested with this batch.

Holding Time Requirements

- All samples were analyzed within the method-specific holding times.

Method Blanks

- The concentration levels of all the requested analytes in the method blank were below the reporting detection limits.

Internal Quality Control

All Internal Quality Control were within acceptance limits with the following exceptions:

For silver, the fifth and sixth CCVs (continuing calibration verification) recovered above the window of acceptance however, all samples of interest were bracketed by acceptable CCVs therefore, sample results are not affected.

Sample Results

- All methods were performed according to ILM03.0. The following qualifiers are reported on the basis of the techniques employed to perform the analyses:

  "P" ICPEAS and Trace ICP Method 6010A
  "AV" Cold Vapor AA Method 7470A

Nalini Prabhakar	07/15/97
Prepared By	**Date**

CASE NARRATIVE
INORGANIC ANALYSES
TOTAL RECOVERABLE METALS

The routine calibration and quality control analyses performed for this batch include as applicable: instrument tune (ICP/MS only), initial and continuing calibration verification, initial and continuing calibration blanks, method blank(s), laboratory control sample(s), ICP interference check samples (ICP only), serial dilutions, analytical (post-digestion) spike samples, matrix spike (predigestion) sample(s) and duplicate sample(s).

Preparation and Analysis Requirements

- Seven water samples for total recoverable metals analysis. The samples were prepared and analyzed as LAS Batch 614ITX and analyzed for selected analytes as requested on the chain-of-custody. Sample RUW-00106 (L9696-46) was used for matrix spike, duplicate, post-digestion spike and serial dilution analyses. All flags due to the performance of the above-mentioned QC samples are also associated with every sample digested with this batch.

Holding Time Requirements

- All samples were analyzed within the method-specific holding times.

Method Blanks

- The concentration levels of all the requested analytes in the method blank were below the reporting detection limits.

Internal Quality Control

All Internal Quality Control were within acceptance limits.

Sample Results

- The following methods and qualifiers are reported on the basis of the techniques employed to perform the analyses:

Method 6010A "P" ICP

Nalini Prabhakar — 07/15/97

Prepared By — **Date**

CASE NARRATIVE
INORGANIC METALS ANALYSES
POTENTIALLY DISSOLVED LEAD

The routine calibration and quality control analyses performed for this batch include as applicable: instrument tune (ICP/MS only), initial and continuing calibration verification, initial and continuing calibration blanks, method blank(s), laboratory control sample(s), ICP interference check samples (ICP only), serial dilutions, analytical (post-digestion) spike samples, matrix spike (predigestion) sample(s) and duplicate sample(s).

Preparation and Analysis Requirements

- Seven water sample for potentially dissolved lead analysis. The samples were prepared and analyzed as LAS Batch 614IT and analyzed for selected analytes as requested on the chain-of-custody. Sample RUW-00106 (L9696-40) was used for matrix spike and duplicate analyses. All flags due to the performance of the above-mentioned QC sample are also associated with every sample digested with this batch.

Holding Time Requirements

- All samples were analyzed within the method-specific holding times.

Method Blanks

- The concentration levels of all the requested analytes in the method blank were below the reporting detection limits.

Internal Quality Control

All Internal Quality Control were within acceptance limits.

Sample Results

- All methods were performed according to ILM03.0. The following qualifiers are reported on the basis of the techniques employed to perform the analyses:

"F" GFAA Method 7000

Nalini Prabhakar	07/15/97
Prepared By	**Date**

Organic Analytes - Case Narrative

General Introduction

The Case Narrative associated with the determination of organic analytes is separated into three (3) sections as follows:

SECTION 1

A brief word processed description of each method reported in this package. This is a general summary of the procedures used and quality control measures applied. It is not intended to include client-specific requirements. Results relating to initial calibration criteria and continuing calibration criteria are included in this section. This section will also describe any unusual events or important observations from the processing of the samples for each method. The initials of the reporting specialist compiling the Case Narrative with the date compiled will be at the end of this section.

SECTION 2

2. An *Exception Report* for each method printed from our data base that summarizes the results of all quality control (QC) measures. A separate *Exception Report* is included for each "QC Group" necessary for each method. At LAS, a QC Group is also called a "workgroup", or more descriptively, a "QC Batch". Each *Exception Report* includes:
    a. A table listing all the samples in the QC Group by LAS Sample ID and Client Sample ID with the date analyzed and Analytical Batch.
    b. Statement(s) relating to holding times for all samples in the QC Group.
    c. Statement(s) relating to the Method Blank (MB) for all samples in the QC Group.
    d. A list of all samples in the QC Group requiring reanalysis for dilution(s) or QC outliers.
    e. A list of all samples in the QC Group that failed surrogate recovery criteria with the recovery obtained and the Acceptance Limits.
    f. A list of all QC Samples that failed recovery criteria with the recovery obtained and the Acceptance Limits. The QC Samples are a laboratory control sample (LCS) and a matrix spike (MS)/matrix spike duplicate (MSD) pair. If insufficient sample exists for a MS/MSD pair, a laboratory control sample duplicate (LCSD) is included. Some methods call for a LCS/LCSD pair instead of a MS/MSD and some for MS/MSD and LCS/LCSD pairs.
    g. A list of all samples in the QC Group that failed internal standard criteria with the integrated areas of the internal standard(s) and their retention times. Note: Applicable to gas chromatography/mass spectrometry GC/MS methods only.

SECTION 3

A table describing all LAS default data qualifiers (flags) used to qualify the data reported on the result forms. Client-specific qualifiers may augment or replace these LAS default qualifiers.

Method 8015M Extractable Petroleum Hydrocarbons

NOTE: Due to some changes in the LAS Laboratories, Inc. quantification procedures for GC analysis, client samples could either be quantified using the external standard calibration method or the internal standard calibration method. The type of standard calibration used will be discussed in each method under the "Unusual events or important observations from the processing of the samples are as follows:" section of the narrative.

This method quantifies extractable petroleum hydrocarbons using gas chromatography (GC) coupled with a flame ionization detector (FID). Target analytes are ranges of hydrocarbons not specific petroleum products. Examples are of target analytes are product range organics, like Diesel Range Organics or carbon number range organics, like C_{12} to C_{24} Range Organics. All FID-active substances, or practically speaking, all organic species, eluting within the specified range contribute to the reported value. Samples are extracted with an organic solvent to separate the target analytes from the sample matrix. The extract is then concentrated to a final volume. The hydrocarbon range organics in the extract are quantified using GC/FID. To establish the retention time range for the specific target analyte, n-alkanes are analyze to define the chromatographic range of interest. A "common baseline" is then drawn between the n-alkane markers. All peaks eluting within the established retention time range are integrated and the areas summed. Products whose constituents closely match the target range are used to generate a five-point calibration. For example diesel fuel standards are used to calibrate for Diesel Range Organics or C_{12} to C_{24}. Calibration standard chromatograms and sample chromatograms are integrated identically as described above.

Each time that samples are extracted a collection of quality control check samples are also extracted. A MB is extracted to verify that the laboratory procedures are not contaminating the samples. A LCS is extracted which contains the same product used for calibration in a matrix which does not interfere with the analytical procedure. Recoveries of the target analyte in the LCS are compared to control limits to verify that the analytical systems are operating properly. MS/MSD samples are also prepared with each extraction batch, when sufficient sample exists. The MS and MSD samples are portions of client samples that have been spiked identically to the LCS. Recoveries of the spiked products can be used to estimate the accuracy and precision of the measurements in a real client sample matrix, and they can be used to determine the effect of the sample matrix on the analytical procedures. In cases where there is not enough sample for an MS and MSD, a duplicate of the LCS, a LCSD, is prepared. Every sample, MB, MS, MSD, and LCS is spiked with a surrogate compound, n-octacosane, before extraction. Recoveries of the surrogate are used to verify performance of the analytical systems on a sample by sample basis. A group of samples extracted together is called an extraction batch or a QC Group. The procedure used for extraction depends on the sample matrix, so samples with different matrices (e.g. solids, aqueous liquids, solvent-miscible organic fluids, etc.) will be extracted in separate QC Groups.

Before extracts are analyzed the instrument must have an acceptable five-point initial calibration. Daily, a beginning continuing calibration verification is analyzed to determine if the initial calibration is still valid. Extracts are then run in groups of ten. After each ten extracts, another continuing calibration verification is analyzed. If a continuing calibration verification shows that either the absolute instrument response or the retention times have changed since the initial calibration, corrective actions are taken which may include reanalysis of the affected extracts. A group of extracts analyzed between continuing calibration verifications is called an Analytical Batch. The Exception Report(s) in the following section describe any quality control outliers or comments pertaining to each QC Group.

Results relating to initial and continuing calibration criteria are as follows:
All initial calibration criteria were met.
All continuing calibration criteria were met.

Unusual events or important observations from the processing of the samples are as follows:

External Standard Calibration Method was used to quantify sample results.

Method 8020A Aromatic Volatile Organics

NOTE: Due to some changes in the LAS Laboratories, Inc. quantification procedures for GC analysis, client samples could either be quantified using the external standard calibration method or the internal standard calibration method. The type of standard calibration used will be discussed in each method under the "Unusual events or important observations from the processing of the samples are as follows:" section of the narrative.

This method identifies and quantifies aromatic volatile organics using gas chromatography (GC) coupled with a photoionization detector (PID). Samples are placed is a specially designed purging chamber and an inert gas is bubbled through the sample. Volatile compounds partition to the gas phase. The gas then passes through a trap where organic compounds are retained. After the purging cycle, the trap is heated which releases the retained compounds into a GC/PID system. Analytes are quantified based on the absolute response of the analytes compared to the initial calibration. If necessary, target analytes detected at reportable levels on the primary column are confirmed on a second column. Confirmation is necessary only when analyzing an unfamiliar matrix or a complex matrix producing GC/PID chromatograms that are difficult to interpret. Standards of the analytes to be confirmed are analyzed on the second column to establish retention times and ensure the analytes to be confirmed can be confirmed at the levels detected. Gas chromatography/mass spectrometry can also be used for confirmation. Analytes that are not confirmed are reported as less than the reporting limit.

Each time that samples are purged quality control check samples are also analyzed. A MB is purged to verify that the system is not contaminating the samples. A LCS containing some or all target analytes in a matrix which does not interfere with the analytical procedure is also purged. Recoveries of analytes in the LCS are compared to control limits to verify that the analytical systems are operating properly. A MS/MSD pair are also analyzed for each group of twenty samples. The MS and MSD samples are portions of client samples that have been spiked identically to the LCS. MS/MSD recoveries can be used to estimate the accuracy and precision of the measurements in a real client sample matrix, and they can be used to determine the effect of the sample matrix on the analytical procedures. Every sample, MB, MS, MSD, and LCS is spiked with surrogates before purging. Recoveries of the surrogates are used to verify performance of the analytical system on a sample by sample basis.

Before samples are analyzed the instrument must have an acceptable five-point initial calibration. Daily, a beginning continuing calibration verification is analyzed to determine if the initial calibration is still valid. Samples are then run in groups of ten. After each ten samples, another continuing calibration verification is analyzed. If a continuing calibration verification shows that either the absolute instrument response or the retention times have changed since the initial calibration, corrective actions are taken which may include reanalysis of the affected samples. A group of samples analyzed between continuing calibration verifications is called an Analytical Batch. A group of samples associated with a MS/MSD pair is called a QC Group. The Exception Report(s) in the following section describe any quality control outliers or comments pertaining to each QC Group.

Results relating to initial and continuing calibration criteria are as follows:
All initial calibration criteria were met.
All continuing calibration criteria were met.

Unusual events or important observations from the processing of the samples are as follows:

Internal Standard Calibration Method was used to quantify sample results.

Prepared By
Patricia Lonergan

July 18, 1997

LAS LABORATORIES

TOTAL PETROLEUM HYDROCARBONS (TPH)
EXCEPTION REPORT
QC GROUP: 8015M - TPH_49739

SAMPLE SUMMARY

LAS Sample ID	Client Sample ID	Date Analyzed	Analytical Batch
49739LCS	Lab Ctrl Sample	01-JUL-97	062697-8015-D-4
49739MB	Method Blank	01-JUL-97	062697-8015-D-4
49739MS	RUW-00106	01-JUL-97	062697-8015-D-4
49739MSD	RUW-00106	01-JUL-97	062697-8015-D-4
L9696-31	RUW-00106	01-JUL-97	062697-8015-D-4
L9696-34	RUW-00107	02-JUL-97	062697-8015-D-4
L9696-35	RUW-00108	02-JUL-97	062697-8015-D-4
L9696-36	RUW-00109	02-JUL-97	062697-8015-D-4
L9696-37	RUW-00110	02-JUL-97	062697-8015-D-4
L9696-38	RUW-00111	02-JUL-97	062697-8015-D-4
L9696-39	RUW-00112	02-JUL-97	062697-8015-D-4
L9708-1	2673-97-2	02-JUL-97	062697-8015-D-4

HOLDING TIMES
__X__ All holding times were met for samples in this QC group.
__X__ The extraction holding times were met.
__X__ The analytical holding times were met.

METHOD BLANK

__X__ No target analytes were detected in the method blank(s).

SAMPLE RESULTS

__X__ No samples in the QC group required reanalysis.

__X__ No samples in the QC group required a dilution.

SURROGATE RECOVERIES

__X__ All surrogate recoveries met criteria for this QC group.

QC SAMPLE RESULTS

__X__ All QC samples met criteria for this QC group.

LAS LABORATORIES

8020A BTEX
EXCEPTION REPORT
QC GROUP: P&T GAS/BTEX_50904

SAMPLE SUMMARY

LAS Sample ID	Client Sample ID	Date Analyzed	Analytical Batch
50904LCS	Lab Ctrl Sample	24-JUN-97	052297-BTEX-GC3
50904MB	Method Blank	24-JUN-97	052297-BTEX-GC3
50904MS	RUW-00106	24-JUN-97	052297-BTEX-GC3
50904MSD	RUW-00106	24-JUN-97	052297-BTEX-GC3
L9696-1	RUW-00106	24-JUN-97	052297-BTEX-GC3
L9696-10	RUW-00107	24-JUN-97	052297-BTEX-GC3
L9696-13	RUW-00108	24-JUN-97	052297-BTEX-GC3
L9696-16	RUW-00109	24-JUN-97	052297-BTEX-GC3
L9696-19	RUW-00110	24-JUN-97	052297-BTEX-GC3
L9696-22	RUW-00111	24-JUN-97	052297-BTEX-GC3
L9696-25	RUW-00112	24-JUN-97	052297-BTEX-GC3
L9696-28	RUW-00113	24-JUN-97	052297-BTEX-GC3

HOLDING TIMES
__X__ All holding times were met for samples in this QC group.
__X__ The analytical holding times were met.

METHOD BLANK

__X__ No target analytes were detected in the method blank(s).

SAMPLE RESULTS

__X__ No samples in the QC group required reanalysis.

__X__ No samples in the QC group required a dilution.

SURROGATE RECOVERIES

__X__ All surrogate recoveries met criteria for this QC group.

QC SAMPLE RESULTS

__X__ All QC samples met criteria for this QC group.

Sample Number and Associated Well

Sample Number	Well Number
RUW-00106	RU-3
RUW-00107	RU-5
RUW-00108	RU-6A
RUW-00109	RU-6A (Duplicate)
RUW-00110	RU-8

LAS LABORATORIES

TOTAL PETROLEUM HYDROCARBONS (TPH)
8015M - TPH

Client Sample ID:	RUW-00106	LAS Sample ID:	L9696-31
Date Collected:	12-JUN-97	Date Received:	14-JUN-97
Date Analyzed:	01-JUL-97	Analytical Batch ID:	062697-8015-D-4
Date Extracted:	18-JUN-97	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	1.0
		QC Group:	8015M - TPH_49739

SURROGATE	RECOVERY	QC Limits
n-OCTACOSANE	52%	26-152

CONSTITUENT	CAS NO.	RESULT mg/L	PQL mg/L	DATA QUALIFIER(S)
Diesel Range Organics	TPH	<1.0	1.0	

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LAS LABORATORIES

TOTAL PETROLEUM HYDROCARBONS (TPH)
8015M - TPH

Client Sample ID:	RUW-00107	LAS Sample ID:	L9696-34
Date Collected:	12-JUN-97	Date Received:	14-JUN-97
Date Analyzed:	02-JUL-97	Analytical Batch ID:	062697-8015-D-4
Date Extracted:	18-JUN-97	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	1.1
		QC Group:	8015M - TPH_49739

SURROGATE	RECOVERY	QC Limits
n-OCTACOSANE	49%	26-152

CONSTITUENT	CAS NO.	RESULT mg/L	PQL mg/L	DATA QUALIFIER(S)
Diesel Range Organics	TPH	<1.1	1.1	

LAS LABORATORIES

TOTAL PETROLEUM HYDROCARBONS (TPH)
8015M - TPH

Client Sample ID:	RUW-00108	LAS Sample ID:	L9696-35
Date Collected:	12-JUN-97	Date Received:	14-JUN-97
Date Analyzed:	02-JUL-97	Analytical Batch ID:	062697-8015-D-4
Date Extracted:	18-JUN-97	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	1.0
		QC Group:	8015M - TPH_49739

SURROGATE	RECOVERY	QC Limits
n-OCTACOSANE	56%	26-152

CONSTITUENT	CAS NO.	RESULT mg/L	PQL mg/L	DATA QUALIFIER(S)
Diesel Range Organics	TPH	<1.0	1.0	

LAS LABORATORIES

TOTAL PETROLEUM HYDROCARBONS (TPH)
8015M - TPH

Client Sample ID:	RUW-00109	LAS Sample ID:	L9696-36
Date Collected:	12-JUN-97	Date Received:	14-JUN-97
Date Analyzed:	02-JUL-97	Analytical Batch ID:	062697-8015-D-4
Date Extracted:	18-JUN-97	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	1.0
		QC Group:	8015M - TPH_49739

SURROGATE	RECOVERY	QC Limits
n-OCTACOSANE	60%	26-152

CONSTITUENT	CAS NO.	RESULT mg/L	PQL mg/L	DATA QUALIFIER(S)
Diesel Range Organics	TPH	<1.0	1.0	

LAS LABORATORIES

TOTAL PETROLEUM HYDROCARBONS (TPH)
8015M - TPH

Client Sample ID:	RUW-00110	LAS Sample ID:	L9696-37
Date Collected:	12-JUN-97	Date Received:	14-JUN-97
Date Analyzed:	02-JUL-97	Analytical Batch ID:	062697-8015-D-4
Date Extracted:	18-JUN-97	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	1.3
		QC Group:	8015M - TPH_49739

SURROGATE	RECOVERY	QC Limits
n-OCTACOSANE	45%	26-152

CONSTITUENT	CAS NO.	RESULT mg/L	PQL mg/L	DATA QUALIFIER(S)
Diesel Range Organics	TPH	<1.3	1.3	

8020A BTEX
P&T GAS/BTEX

Client Sample ID:	RUW-00107	LAS Sample ID:	L9696-10
Date Collected:	12-JUN-97	Date Received:	14-JUN-97
Date Analyzed:	24-JUN-97	Analytical Batch ID:	052297-BTEX-GC3
Date Extracted:	N/A	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	1.0

SURROGATE	RECOVERY	QC Limits
BFB	98%	60-140
1,4-DFB	96%	75-125

CONSTITUENT	CAS NO.	RESULT ug/L	PQL ug/L	DATA QUALIFIER(S)
Benzene	71-43-2	<0.50	0.50	
Toluene	108-88-3	<1.0	1.0	
Ethylbenzene	100-41-4	<1.0	1.0	
M & P Xylene	136777-61-2	<1.0	1.0	
O Xylene	95-47-6	<1.0	1.0	

LAS LABORATORIES

8020A BTEX
P&T GAS/BTEX

Client Sample ID:	RUW-00108	LAS Sample ID:	L9696-13
Date Collected:	12-JUN-97	Date Received:	14-JUN-97
Date Analyzed:	24-JUN-97	Analytical Batch ID:	052297-BTEX-GC3
Date Extracted:	N/A	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	1.0

SURROGATE	RECOVERY	QC Limits
1,4-DFB	96%	75-125
BFB	96%	60-140

CONSTITUENT	CAS NO.	RESULT ug/L	PQL ug/L	DATA QUALIFIER(S)
Benzene	71-43-2	<0.50	0.50	
Toluene	108-88-3	<1.0	1.0	
Ethylbenzene	100-41-4	<1.0	1.0	
M & P Xylene	136777-61-2	<1.0	1.0	
O Xylene	95-47-6	<1.0	1.0	

8020A BTEX
P&T GAS/BTEX

Client Sample ID:	RUW-00109	LAS Sample ID:	L9696-16
Date Collected:	12-JUN-97	Date Received:	14-JUN-97
Date Analyzed:	24-JUN-97	Analytical Batch ID:	052297-BTEX-GC3
Date Extracted:	N/A	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	1.0

SURROGATE	RECOVERY	QC Limits
BFB	98%	60-140
1,4-DFB	96%	75-125

CONSTITUENT	CAS NO.	RESULT ug/L	PQL ug/L	DATA QUALIFIER(S)
Benzene	71-43-2	<0.50	0.50	
Toluene	108-88-3	<1.0	1.0	
Ethylbenzene	100-41-4	<1.0	1.0	
M & P Xylene	136777-61-2	<1.0	1.0	
O Xylene	95-47-6	<1.0	1.0	

LAS LABORATORIES

8020A BTEX
P&T GAS/BTEX

Client Sample ID:	RUW-00110	LAS Sample ID:	L9696-19
Date Collected:	12-JUN-97	Date Received:	14-JUN-97
Date Analyzed:	24-JUN-97	Analytical Batch ID:	052297-BTEX-GC3
Date Extracted:	N/A	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	1.0

SURROGATE	RECOVERY	QC Limits
BFB	98%	60-140
1,4-DFB	96%	75-125

CONSTITUENT	CAS NO.	RESULT ug/L	PQL ug/L	DATA QUALIFIER(S)
Benzene	71-43-2	<0.50	0.50	
Toluene	108-88-3	<1.0	1.0	
Ethylbenzene	100-41-4	<1.0	1.0	
M & P Xylene	136777-61-2	<1.0	1.0	
O Xylene	95-47-6	<1.0	1.0	

CLP

1

INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

RUW-00106

Lab Name: L.A.S Contract: IT_INT.

Lab Code: LOCK Case No.: 614IT SAS No.: SDG No.: L9696W

Matrix (soil/water): WATER Lab Sample ID: L9696-43

Level (low/med): LOW Date Received: 06/14/97

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	5.6	~~B~~		P
7440-39-3	Barium	90.3	~~B~~		P
7440-43-9	Cadmium	1.0	U		P
7440-47-3	Chromium	5.0	~~B~~		P
7439-92-1	Lead	2.5	~~B~~		P
7439-97-6	Mercury	0.20	U		AV
7782-49-2	Selenium	3.0	U		P
7440-22-4	Silver	1.0	U		P

Color Before: COLORLESS Clarity Before: CLOUDY Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

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CLP

1

INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

RUW-00107

Lab Name: L.A.S

Contract: IT_INT.

Lab Code: LOCK

Case No.: 614IT

SAS No.:

SDG No.: L9696W

Matrix (soil/water): WATER

Lab Sample ID: L9696-50

Level (low/med): LOW

Date Received: 06/14/97

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	5.3	~~B~~		P
7440-39-3	Barium	89.8	~~B~~		P
7440-43-9	Cadmium	1.0	U		P
7440-47-3	Chromium	1.8	~~B~~		P
7439-92-1	Lead	3.1			P
7439-97-6	Mercury	0.20	U		AV
7782-49-2	Selenium	3.0	U		P
7440-22-4	Silver	1.0	U		P

Color Before: COLORLESS

Clarity Before: CLOUDY

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

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CLP

1

INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

RUW-00108

Lab Name: L.A.S Contract: IT_INT.

Lab Code: LOCK Case No.: 614IT SAS No.: SDG No.: L9696W

Matrix (soil/water): WATER Lab Sample ID: L9696-53

Level (low/med): LOW Date Received: 06/14/97

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	3.3	~~B~~		P
7440-39-3	Barium	130	~~B~~		P
7440-43-9	Cadmium	1.0	U		P
7440-47-3	Chromium	1.0	U		P
7439-92-1	Lead	2.0	U		P
7439-97-6	Mercury	0.20	U		AV
7782-49-2	Selenium	3.0	U		P
7440-22-4	Silver	1.0	U		P

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

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1

INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

RUW-00109

Lab Name: L.A.S Contract: IT_INT.

Lab Code: LOCK Case No.: 614IT SAS No.: SDG No.: L9696W

Matrix (soil/water): WATER Lab Sample ID: L9696-55

Level (low/med): LOW Date Received: 06/14/97

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	3.4	B		P
7440-39-3	Barium	130	B		P
7440-43-9	Cadmium	1.0	U		P
7440-47-3	Chromium	1.0	U		P
7439-92-1	Lead	2.0	U		P
7439-97-6	Mercury	0.20	U		AV
7782-49-2	Selenium	3.0	U		P
7440-22-4	Silver	1.0	U		P

Color Before: COLORLESS Clarity Before: CLOUDY Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

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CLP

1
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

RUW-00110

Lab Name: L.A.S______________________ Contract: IT_INT.___

Lab Code: LOCK__ Case No.: 614IT_ SAS No.: ______ SDG No.: L9696W

Matrix (soil/water): WATER Lab Sample ID: L9696-58__

Level (low/med): LOW__ Date Received: 06/14/97

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic__	5.4	~~B~~		P_
7440-39-3	Barium__	146	~~B~~		P_
7440-43-9	Cadmium__	1.0	U		P_
7440-47-3	Chromium_	3.1	~~B~~		P_
7439-92-1	Lead___	3.5			P_
7439-97-6	Mercury__	0.20	U		AV
7782-49-2	Selenium_	3.0	U		P_
7440-22-4	Silver__	1.0	U		P_

Color Before: COLORLESS Clarity Before: CLOUDY Texture: ______

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: ______

Comments:

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F-8 Third Quarter 1997 Analytical Results

A Subsidiary of SPL Incorporated

LAS Laboratories, Inc.

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IT INTERNATIONAL CORPORATION

ANALYTICAL DATA REPORT

FOR

TOTAL METALS, TOTAL RECOVERABLE METALS, POTENTIALLY DISSOLVED LEAD, TOTAL DISSOLVED SOLIDS, TOTAL SUSPENDED SOLIDS, VOLATILE AND TOTAL PETROLEUM HYDROCARBON ORGANICS

LOG-IN NUMBER	L10351
QUOTATION NUMBER	P701740-RULISON
DOCUMENT FILE NUMBER	0822305

LAS LABORATORIES, INC. • 975 Kelly Johnson Drive • Las Vegas, Nevada 89119-3705
Telephone 702-361-0220 • Facsimile 702-361-8146

October 8, 1997

Mr. Kurt Schmidt
IT International Corporation
2621 Losee Road Building B-1, Suite 3501
North Las Vegas, NV 89030

RE: Log-in No. L10351
Quotation No. P701740-RULISON
Document File No. 0822305

The attached data report contains the analytical results of samples that were submitted to LAS Laboratories, Inc. on 22 August 1997.

The temperatures of the coolers upon receipt were 2, 2, and 3°C. All sample containers coincided with the chain-of-custody documentation. All sample containers were received intact. Samples were received in time to meet the analytical holding time requirements. The following samples for volatile analysis contained headspace: RUW00117 and RUW00115. All discrepancies (if applicable) identified upon receipt of the samples have been forwarded to the client and are documented in the enclosed chain-of-custody records. (See attached Sample Receiving Checklist for details).

The case narratives included in the following attachments provide a detailed description of all events that occurred during sample preparation, analysis, and data review specific to the samples and analytical methods requested.

A list of data qualifiers, chain-of-custody forms, sample receiving checklist, and log-in report are also enclosed representing the samples received within this group.

If you have any questions concerning the analysis or the data, please call Jenny Davis at (702) 361-3955, ext 213. If you are unable to contact the Client Services Representative, please call Dan Fischer, Client Services Manager, at extension 240.

Release of this data report has been authorized by the Laboratory Director or the Director's designee as evidenced by the following signature.

Sincerely,

Jenny L. Davis

Jenny L. Davis
Client Services Representative

cc: Client Services
Document Control

LAS Laboratories, Inc.

Log-in No. L10351
Quotation No. P701740-RULISON
Document File No. 0822305

CASE NARRATIVE
INORGANIC NON-METALS ANALYSES

The routine calibration and quality control analyses performed for this batch include as applicable: initial and continuing calibration verification, initial and continuing calibration blanks, method blank(s), laboratory control sample(s), matrix spike sample(s), and duplicate sample(s).

Preparation and Analysis Requirements

All samples were received on August 22 1997. The samples were logged in as L10351 and prepared and analyzed for:

A. Method - 160.1 Total Dissolved Solids
B. Method - 160.2 Total Suspended Solids

Method Blanks

- The concentration levels of all requested analytes in method blanks were below the reporting detection limits.

Holding Time Requirements

- All samples were analyzed within method-specific holding times.

Internal Quality Control

- All Internal Quality Control were within acceptance limits.

M.B. Watson-Garrett
Prepared By

5 September 1997
Date

CASE NARRATIVE
INORGANIC METALS ANALYSES
WATER

The routine calibration and quality control analyses performed for this batch include as applicable: instrument tune (ICP/MS only), initial and continuing calibration verification, initial and continuing calibration blanks, method blank(s), laboratory control sample(s), ICP interference check samples (ICP only), serial dilutions, analytical (post-digestion) spike samples, matrix spike (predigestion) sample(s), and duplicate sample(s).

Preparation and Analysis Requirements

- Six water samples for metals analysis. The samples were prepared and analyzed as LAS Batch 822IT. They were analyzed for the analytes requested by the chain-of-custody. The LAS login for this batch is L10351W. Sample RUW00117 (L10351-38) was used for matrix spike, matrix spike duplicate, and post-digestion spike analyses. All flags due to the performance of the above-mentioned QC sample are also associated with every sample digested with this batch.

Holding Time Requirements

- All samples were analyzed within the method-specific holding times.

Method Blanks

- Concentration levels of requested analytes in method blanks were below reporting detection limits.

Internal Quality Control

- All Internal Quality Control were within acceptance limits.

Sample Results

- All methods were performed according to ILM03.0. The following qualifiers are reported on the basis of the techniques employed to perform the analyses:
  "P" ICPAES - Trace 6010A
  "AV" Cold Vapor AA - Mercury 7470A

Milinka B. Watson-Garrett — 9/30/97
Prepared By — **Date**

NOTE: Due to software limitations, the level 2 report has all results show up on the same page for the total metals, total recoverable metals and potentially dissolved lead. The total metals are in workgroups 53314 and 53315, the total recoverable metals are in workgroup 53316 and the potentially dissolved lead is in workgroup 52763.

CASE NARRATIVE
INORGANIC METALS ANALYSES
TOTAL RECOVERABLE

The routine calibration and quality control analyses performed for this batch include as applicable: instrument tune (ICP/MS only), initial and continuing calibration verification, initial and continuing calibration blanks, method blank(s), laboratory control sample(s), ICP interference check samples (ICP only), serial dilutions, analytical (post-digestion) spike samples, matrix spike (predigestion) sample(s), and duplicate sample(s).

Preparation and Analysis Requirements

- Six water samples for total recoverable metals analysis. The samples were prepared and analyzed as LAS Batch 822ITX. They were analyzed for analytes as requested on the chain-of-custody. The LAS login for this batch is L10351W. Sample RUW00117 (L10351-62) was used for matrix spike, matrix spike duplicate, serial dilution and post-digestion spike analyses. All flags due to the performance of the above-mentioned QC sample are also associated with every sample digested with this batch.

Holding Time Requirements

- All samples were analyzed within the method-specific holding times.

Method Blanks

- Concentration levels of requested analytes in method blanks were below reporting detection limits.

Internal Quality Control

- All Internal Quality Control were within acceptance limits.

Sample Results

- All methods were performed according to ILM03.0. The following qualifiers are reported on the basis of the techniques employed to perform the analyses:

"P" ICPAES Method 6010A

Milinka B. Watson-Garrett
Prepared By

9/30/97
Date

CASE NARRATIVE
INORGANIC METALS ANALYSES
POTENTIALLY DISSOLVED LEAD

The routine calibration and quality control analyses performed for this batch include as applicable: instrument tune (ICP/MS only), initial and continuing calibration verification, initial and continuing calibration blanks, method blank(s), laboratory control sample(s), ICP interference check samples (ICP only), serial dilutions, analytical (post-digestion) spike samples, matrix spike (predigestion) sample(s), and duplicate sample(s).

Preparation and Analysis Requirements

- Six water samples for potentially dissolved lead analysis. The samples were prepared and analyzed as LAS Batch 822IT. They were analyzed for potentially dissolved lead as requested by the chain-of-custody. The LAS login for this batch is L10351W. Sample RUW00117 (L10351-70) was used for matrix spike, matrix spike duplicate, and post-digestion spike analyses. All flags due to the performance of the above-mentioned QC sample are also associated with every sample digested with this batch.

Holding Time Requirements

- All samples were analyzed within the method-specific holding times.

Method Blanks

- Concentration levels of requested analyte in the method blank was below reporting detection limits.

Internal Quality Control

- All Internal Quality Control were within acceptance limits.

Sample Results

- All methods were performed according to ILM03.0. The following qualifiers are reported on the basis of the techniques employed to perform the analyses:

"F" Furnace - 7000

Milinka B. Watson-Garrett
Prepared By

9/30/97
Date

Organic Analytes - Case Narrative

General Introduction

The Case Narrative associated with the determination of organic analytes is separated into three (3) sections as follows:

SECTION 1

A brief word processed description of each method reported in this package. This is a general summary of the procedures used and quality control measures applied. It is not intended to include client-specific requirements. Results relating to initial calibration criteria and continuing calibration criteria are included in this section. This section will also describe any unusual events or important observations from the processing of the samples for each method. The initials of the reporting specialist compiling the Case Narrative with the date compiled will be at the end of this section.

SECTION 2

2. An *Exception Report* for each method printed from our data base that summarizes the results of all quality control (QC) measures. A separate *Exception Report* is included for each "QC Group" necessary for each method. At LAS, a QC Group is also called a "workgroup", or more descriptively, a "QC Batch". Each *Exception Report* includes:
   a. A table listing all the samples in the QC Group by LAS Sample ID and Client Sample ID with the date analyzed and Analytical Batch.
   b. Statement(s) relating to holding times for all samples in the QC Group.
   c. Statement(s) relating to the Method Blank (MB) for all samples in the QC Group.
   d. A list of all samples in the QC Group requiring reanalysis for dilution(s) or QC outliers.
   e. A list of all samples in the QC Group that failed surrogate recovery criteria with the recovery obtained and the Acceptance Limits.
   f. A list of all QC Samples that failed recovery criteria with the recovery obtained and the Acceptance Limits. The QC Samples are a laboratory control sample (LCS) and a matrix spike (MS)/matrix spike duplicate (MSD) pair. If insufficient sample exists for a MS/MSD pair, a laboratory control sample duplicate (LCSD) is included. Some methods call for a LCS/LCSD pair instead of a MS/MSD and some for MS/MSD and LCS/LCSD pairs.
   g. A list of all samples in the QC Group that failed internal standard criteria with the integrated areas of the internal standard(s) and their retention times. Note: Applicable to gas chromatography/mass spectrometry GC/MS methods only.

SECTION 3

A table describing all LAS default data qualifiers (flags) used to qualify the data reported on the result forms. Client-specific qualifiers may augment or replace these LAS default qualifiers.

Note: Due to some changes in the LAS Laboratories, Inc. quantification procedures for GC analysis, client samples could either be quantified using the external standard calibration method or the internal standard calibration method. The type of standard calibration used will be discussed in each method under the "Unusual events or important observations from the processing of the samples are as follows:" section of the narrative.

Method 8015M Extractable Petroleum Hydrocarbons

This method quantifies extractable petroleum hydrocarbons using gas chromatography (GC) coupled with a flame ionization detector (FID). Target analytes are ranges of hydrocarbons not specific petroleum products. Examples are of target analytes are product range organics, like Diesel Range Organics or carbon number range organics, like C_{12} to C_{24} Range Organics. All FID-active substances, or practically speaking, all organic species, eluting within the specified range contribute to the reported value. Samples are extracted with an organic solvent to separate the target analytes from the sample matrix. The extract is then concentrated to a final volume. The hydrocarbon range organics in the extract are quantified using GC/FID. To establish the retention time range for the specific target analyte, n-alkanes are analyze to define the chromatographic range of interest. A "common baseline" is then drawn between the n-alkane markers. All peaks eluting within the established retention time range are integrated and the areas summed. Products whose constituents closely match the target range are used to generate a five-point calibration. For example diesel fuel standards are used to calibrate for Diesel Range Organics or C_{12} to C_{24}. Calibration standard chromatograms and sample chromatograms are integrated identically as described above.

Each time that samples are extracted a collection of quality control check samples are also extracted. A MB is extracted to verify that the laboratory procedures are not contaminating the samples. A LCS is extracted which contains the same product used for calibration in a matrix which does not interfere with the analytical procedure. Recoveries of the target analyte in the LCS are compared to control limits to verify that the analytical systems are operating properly. MS/MSD samples are also prepared with each extraction batch, when sufficient sample exists. The MS and MSD samples are portions of client samples that have been spiked identically to the LCS. Recoveries of the spiked products can be used to estimate the accuracy and precision of the measurements in a real client sample matrix, and they can be used to determine the effect of the sample matrix on the analytical procedures. In cases where there is not enough sample for an MS and MSD, a duplicate of the LCS, a LCSD, is prepared. Every sample, MB, MS, MSD, and LCS is spiked with a surrogate compound, n-octacosane, before extraction. Recoveries of the surrogate are used to verify performance of the analytical systems on a sample by sample basis. A group of samples extracted together is called an extraction batch or a QC Group. The procedure used for extraction depends on the sample matrix, so samples with different matrices (e.g. solids, aqueous liquids, solvent-miscible organic fluids, etc.) will be extracted in separate QC Groups.

Before extracts are analyzed the instrument must have an acceptable five-point initial calibration. Daily, a beginning continuing calibration verification is analyzed to determine if the initial calibration is still valid. Extracts are then run in groups of ten. After each ten extracts, another continuing calibration verification is analyzed. If a continuing calibration verification shows that either the absolute instrument response or the retention times have changed since the initial calibration, corrective actions are taken which may include reanalysis of the affected extracts. A group of extracts analyzed between continuing calibration verifications is called an Analytical Batch. The Exception Report(s) in the following section describe any quality control outliers or comments pertaining to each QC Group.

Results relating to initial and continuing calibration criteria are as follows:

All initial calibration criteria were met.
All continuing calibration criteria were met.

Unusual events or important observations from the processing of the samples are as follows:

The samples were quantified using the external standard calibration method.

The recovery for the surrogate compound n-Octacosane were eleveted in most of the client samples, due to an increase in the response for this compound. Since, the samples were non-detects for Diesel Range Organics and the 52786MS, 52786MSD, and 52786LCS spike recoveries were within QC limits, the data were reported.

Method 8020 Aromatic Volatile Organics

This method identifies and quantifies aromatic volatile organics using gas chromatography (GC) coupled with a photoionization detector (PID). Samples are placed is a specially designed purging chamber and an inert gas is bubbled through the sample. Volatile compounds partition to the gas phase. The gas then passes through a trap where organic compounds are retained. After the purging cycle, the trap is heated which releases the retained compounds into a GC/PID system. Analytes are quantified based on the absolute response of the analytes compared to the initial calibration. If necessary, target analytes detected at reportable levels on the primary column are confirmed on a second column. Confirmation is necessary only when analyzing an unfamiliar matrix or a complex matrix producing GC/PID chromatograms that are difficult to interpret. Standards of the analytes to be confirmed are analyzed on the second column to establish retention times and ensure the analytes to be confirmed can be confirmed at the levels detected. Gas chromatography/mass spectrometry can also be used for confirmation. Analytes that are not confirmed are reported as less than the reporting limit.

Each time that samples are purged quality control check samples are also analyzed. A MB is purged to verify that the system is not contaminating the samples. A LCS containing some or all target analytes in a matrix which does not interfere with the analytical procedure is also purged. Recoveries of analytes in the LCS are compared to control limits to verify that the analytical systems are operating properly. A MS/MSD pair are also analyzed for each group of twenty samples. The MS and MSD samples are portions of client samples that have been spiked identically to the LCS. MS/MSD recoveries can be used to estimate the accuracy and precision of the measurements in a real client sample matrix, and they can be used to determine the effect of the sample matrix on the analytical procedures. Every sample, MB, MS, MSD, and LCS is spiked with surrogates before purging. Recoveries of the surrogates are used to verify performance of the analytical system on a sample by sample basis.

Before samples are analyzed the instrument must have an acceptable five-point initial calibration. Daily, a beginning continuing calibration verification is analyzed to determine if the initial calibration is still valid. Samples are then run in groups of ten. After each ten samples, another continuing calibration verification is analyzed. If a continuing calibration verification shows that either the absolute instrument response or the retention times have changed since the initial calibration, corrective actions are taken which may include reanalysis of the affected samples. A group of samples analyzed between continuing calibration verifications is called an Analytical Batch. A group of samples associated with a MS/MSD pair is called a QC Group. The Exception Report(s) in the following section describe any quality control outliers or comments pertaining to each QC Group.

Results relating to initial and continuing calibration criteria are as follows:

All initial calibration criteria were met.
All continuing calibration criteria were met.

Unusual events or important observations from the processing of the samples are as follows:

The samples were quantified using the internal standard calibration method.

Lydia M. Coleman
Prepared By

October 7, 1997
Date

LAS LABORATORIES

TOTAL PETROLEUM HYDROCARBONS (TPH)
EXCEPTION REPORT
QC GROUP: 8015M - TPH_52786

SAMPLE SUMMARY

LAS Sample ID	Client Sample ID	Date Analyzed	Analytical Batch
52786LCS	Lab Ctrl Sample	26-SEP-97	092597-8015-D-1
52786MB	Method Blank	26-SEP-97	092597-8015-D-1
52786MS	RUW00117	26-SEP-97	092597-8015-D-1
52786MSD	RUW00117	26-SEP-97	092597-8015-D-1
L10351-28	RUW00114	26-SEP-97	092597-8015-D-1
L10351-29	RUW00116	26-SEP-97	092597-8015-D-1
L10351-30	RUW00117	26-SEP-97	092597-8015-D-1
L10351-33	RUW00118	26-SEP-97	092597-8015-D-1
L10351-34	RUW00119	26-SEP-97	092597-8015-D-1
L10351-35	RUW00121	26-SEP-97	092597-8015-D-1

HOLDING TIMES
__X__ All holding times were met for samples in this QC group.
__X__ The extraction holding times were met.
__X__ The analytical holding times were met.

METHOD BLANK

__X__ No target analytes were detected in the method blank(s).

SAMPLE RESULTS

__X__ No samples in the QC group required reanalysis.

__X__ No samples in the QC group required a dilution.

SURROGATE RECOVERIES

__X__ The following samples failed the recovery criteria for this QC group.

LAS Sample ID	Client Sample ID	Parameter	Recovery	Limits
52786LCS	Lab Ctrl Sample	n-OCTACOSANE	172%	26-152
52786MB	Method Blank	n-OCTACOSANE	178%	26-152
52786MS	RUW00117	n-OCTACOSANE	193%	26-152
52786MSD	RUW00117	n-OCTACOSANE	201%	26-152
L10351-28	RUW00114	n-OCTACOSANE	164%	26-152
L10351-29	RUW00116	n-OCTACOSANE	208%	26-152
L10351-30	RUW00117	n-OCTACOSANE	175%	26-152
L10351-33	RUW00118	n-OCTACOSANE	210%	26-152
L10351-35	RUW00121	n-OCTACOSANE	184%	26-152

QC SAMPLE RESULTS

__X__ All QC samples met criteria for this QC group.

LAS LABORATORIES

P&T GAS/BTEX
EXCEPTION REPORT
QC GROUP: P&T GAS/BTEX_53446

SAMPLE SUMMARY

LAS Sample ID	Client Sample ID	Date Analyzed	Analytical Batch
53446LCS-1	Lab Ctrl Sample	27-AUG-97	082797-BTEX-GC1-
53446LCS-2	Lab Ctrl Sample	27-AUG-97	082797-BTEX-GC1-
53446MB	Method Blank	27-AUG-97	082797-BTEX-GC1-
53446MS-1	RUW00114	27-AUG-97	082797-BTEX-GC1-
53446MS-2	RUW00114	27-AUG-97	082797-BTEX-GC1-
53446MSD-1	RUW00114	27-AUG-97	082797-BTEX-GC1-
53446MSD-2	RUW00114	27-AUG-97	082797-BTEX-GC1-
L10351-1	RUW00114	27-AUG-97	082797-BTEX-GC1-
L10351-10	RUW00117	28-AUG-97	082797-BTEX-GC1-
L10351-19	RUW00118	28-AUG-97	082797-BTEX-GC1-
L10351-22	RUW00119	28-AUG-97	082797-BTEX-GC1-
L10351-25	RUW00121	28-AUG-97	082797-BTEX-GC1-
L10351-4	RUW00115	28-AUG-97	082797-BTEX-GC1-
L10351-7	RUW00116	28-AUG-97	082797-BTEX-GC1-

HOLDING TIMES

__X__ All holding times were met for samples in this QC group.
__X__ The analytical holding times were met.

METHOD BLANK

__X__ No target analytes were detected in the method blank(s).

SAMPLE RESULTS

__X__ No samples in the QC group required reanalysis.

__X__ No samples in the QC group required a dilution.

SURROGATE RECOVERIES

__X__ All surrogate recoveries met criteria for this QC group.

QC SAMPLE RESULTS

__X__ All QC samples met criteria for this QC group.

Table B-1
Sample Number and Description

Sample Number	Sample Location or Description
RUW00114	Well RU-06A
RUW00115	Trip Blank
RUW00116	Duplicate of RUW00114 at RU-06A
RUW00117	Well RU-03
RUW00118	Equipment Rinsate
RUW00119	Well RU-05
RUW00120	Not Collected - Well RU-07 was dry.
RUW00121	Well RU-08

LAS LABORATORIES

TOTAL PETROLEUM HYDROCARBQNS (TPH)
8015M - TPH

Client Sample ID:	RUW00114	LAS Sample ID:	L10351-28
Date Collected:	21-AUG-97	Date Received:	22-AUG-97
Date Analyzed:	26-SEP-97	Analytical Batch ID:	092597-8015-D-1
Date Extracted:	28-AUG-97	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	1.0
		QC Group:	8015M - TPH_52786

SURROGATE	RECOVERY		QC Limits
n-OCTACOSANE	164%	*	26-152

CONSTITUENT	CAS NO.	RESULT mg/L	PQL mg/L	DATA QUALIFIER(S)
Diesel Range Organics	TPH	<1.0	1.0	

LAS LABORATORIES

TOTAL PETROLEUM HYDROCARBONS (TPH)
8015M - TPH

Client Sample ID:	RUW00116	LAS Sample ID:	L10351-29
Date Collected:	21-AUG-97	Date Received:	22-AUG-97
Date Analyzed:	26-SEP-97	Analytical Batch ID:	092597-8015-D-1
Date Extracted:	28-AUG-97	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	1.0
		QC Group:	8015M - TPH_52786

SURROGATE	RECOVERY		QC Limits
n-OCTACOSANE	208%	*	26-152

CONSTITUENT	CAS NO.	RESULT mg/L	PQL mg/L	DATA QUALIFIER(S)
Diesel Range Organics	TPH	<1.0	1.0	

LAS LABORATORIES

TOTAL PETROLEUM HYDROCARBONS (TPH)
8015M - TPH

Client Sample ID:	RUW00117	LAS Sample ID:	L10351-30
Date Collected:	21-AUG-97	Date Received:	22-AUG-97
Date Analyzed:	26-SEP-97	Analytical Batch ID:	092597-8015-D-1
Date Extracted:	28-AUG-97	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	1.0
		QC Group:	8015M - TPH_52786

SURROGATE	RECOVERY		QC Limits
n-OCTACOSANE	175%	*	26-152

CONSTITUENT	CAS NO.	RESULT mg/L	PQL mg/L	DATA QUALIFIER(S)
Diesel Range Organics	TPH	<1.0	1.0	

LAS LABORATORIES

TOTAL PETROLEUM HYDROCARBONS (TPH)
8015M - TPH

Client Sample ID:	RUW00118	LAS Sample ID:	L10351-33
Date Collected:	21-AUG-97	Date Received:	22-AUG-97
Date Analyzed:	26-SEP-97	Analytical Batch ID:	092597-8015-D-1
Date Extracted:	28-AUG-97	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	1.0
		QC Group:	8015M - TPH_52786

SURROGATE	RECOVERY		QC Limits
n-OCTACOSANE	210%	*	26-152

CONSTITUENT	CAS NO.	RESULT mg/L	PQL mg/L	DATA QUALIFIER(S)
Diesel Range Organics	TPH	<1.0	1.0	

LAS LABORATORIES

TOTAL PETROLEUM HYDROCARBONS (TPH)
8015M - TPH

Client Sample ID:	RUW00119	LAS Sample ID:	L10351-34
Date Collected:	21-AUG-97	Date Received:	22-AUG-97
Date Analyzed:	26-SEP-97	Analytical Batch ID:	092597-8015-D-1
Date Extracted:	28-AUG-97	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	1.0
		QC Group:	8015M - TPH_52786

SURROGATE	RECOVERY	QC Limits
n-OCTACOSANE	145%	26-152

CONSTITUENT	CAS NO.	RESULT mg/L	PQL mg/L	DATA QUALIFIER(S)
Diesel Range Organics	TPH	<1.0	1.0	

LAS LABORATORIES

TOTAL PETROLEUM HYDROCARBONS (TPH)
8015M - TPH

Client Sample ID:	RUW00121	LAS Sample ID:	L10351-35
Date Collected:	21-AUG-97	Date Received:	22-AUG-97
Date Analyzed:	26-SEP-97	Analytical Batch ID:	092597-8015-D-1
Date Extracted:	28-AUG-97	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	1.0
		QC Group:	8015M - TPH_52786

SURROGATE	RECOVERY		QC Limits
n-OCTACOSANE	184%	*	26-152

CONSTITUENT	CAS NO.	RESULT mg/L	PQL mg/L	DATA QUALIFIER(S)
Diesel Range Organics	TPH	<1.0	1.0	

P&T GAS/BTEX
P&T GAS/BTEX

Client Sample ID:	RUW00114	LAS Sample ID:	L10351-1
Date Collected:	21-AUG-97	Date Received:	22-AUG-97
Date Analyzed:	27-AUG-97	Analytical Batch ID:	082797-BTEX-GC1-
Date Extracted:	N/A	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	1.0

SURROGATE	RECOVERY	QC Limits
BFB	102%	60-140
1,4-DFB	104%	75-125

CONSTITUENT	CAS NO.	RESULT ug/L	PQL ug/L	DATA QUALIFIER(S)
Benzene	71-43-2	<1.0	1.0	
Toluene	108-88-3	<1.0	1.0	
Ethylbenzene	100-41-4	<1.0	1.0	
m,p-Xylene	136777-61-2	<2.0	2.0	
o-Xylene	95-47-6	<1.0	1.0	

P&T GAS/BTEX
P&T GAS/BTEX

Client Sample ID:	RUW00115	LAS Sample ID:	L10351-4
Date Collected:	21-AUG-97	Date Received:	22-AUG-97
Date Analyzed:	28-AUG-97	Analytical Batch ID:	082797-BTEX-GC1-
Date Extracted:	N/A	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	1.0

SURROGATE	RECOVERY	QC Limits
BFB	98%	60-140
1,4-DFB	104%	75-125

CONSTITUENT	CAS NO.	RESULT ug/L	PQL ug/L	DATA QUALIFIER(S)
Benzene	71-43-2	<1.0	1.0	
Toluene	108-88-3	<1.0	1.0	
Ethylbenzene	100-41-4	<1.0	1.0	
m,p-Xylene	136777-61-2	<2.0	2.0	
o-Xylene	95-47-6	<1.0	1.0	

LAS LABORATORIES

P&T GAS/BTEX
P&T GAS/BTEX

Client Sample ID:	RUW00116	LAS Sample ID:	L10351-7
Date Collected:	21-AUG-97	Date Received:	22-AUG-97
Date Analyzed:	28-AUG-97	Analytical Batch ID:	082797-BTEX-GC1-
Date Extracted:	N/A	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	1.0

SURROGATE	RECOVERY	QC Limits
BFB	95%	60-140
1,4-DFB	102%	75-125

CONSTITUENT	CAS NO.	RESULT ug/L	PQL ug/L	DATA QUALIFIER(S)
Benzene	71-43-2	<1.0	1.0	
Toluene	108-88-3	<1.0	1.0	
Ethylbenzene	100-41-4	<1.0	1.0	
m,p-Xylene	136777-61-2	<2.0	2.0	
o-Xylene	95-47-6	<1.0	1.0	

LAS LABORATORIES

P&T GAS/BTEX
P&T GAS/BTEX

Client Sample ID:	RUW00117	LAS Sample ID:	L10351-10
Date Collected:	21-AUG-97	Date Received:	22-AUG-97
Date Analyzed:	28-AUG-97	Analytical Batch ID:	082797-BTEX-GC1-
Date Extracted:	N/A	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	1.0

SURROGATE	RECOVERY	QC Limits
BFB	96%	60-140
1,4-DFB	105%	75-125

CONSTITUENT	CAS NO.	RESULT ug/L	PQL ug/L	DATA QUALIFIER(S)
Benzene	71-43-2	2.5	1.0	
Toluene	108-88-3	3.9	1.0	
Ethylbenzene	100-41-4	<1.0	1.0	
m,p-Xylene	136777-61-2	<2.0	2.0	
o-Xylene	95-47-6	<1.0	1.0	

LAS LABORATORIES

P&T GAS/BTEX
P&T GAS/BTEX

Client Sample ID:	RUW00118	LAS Sample ID:	L10351-19
Date Collected:	21-AUG-97	Date Received:	22-AUG-97
Date Analyzed:	28-AUG-97	Analytical Batch ID:	082797-BTEX-GC1-
Date Extracted:	N/A	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	1.0

SURROGATE	RECOVERY	QC Limits
BFB	94%	60-140
1,4-DFB	102%	75-125

CONSTITUENT	CAS NO.	RESULT ug/L	PQL ug/L	DATA QUALIFIER(S)
Benzene	71-43-2	<1.0	1.0	
Toluene	108-88-3	<1.0	1.0	
Ethylbenzene	100-41-4	<1.0	1.0	
m,p-Xylene	136777-61-2	<2.0	2.0	
o-Xylene	95-47-6	<1.0	1.0	

LAS LABORATORIES

P&T GAS/BTEX
P&T GAS/BTEX

Client Sample ID:	RUW00119	LAS Sample ID:	L10351-22
Date Collected:	21-AUG-97	Date Received:	22-AUG-97
Date Analyzed:	28-AUG-97	Analytical Batch ID:	082797-BTEX-GC1-
Date Extracted:	N/A	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	1.0

SURROGATE	RECOVERY	QC Limits
BFB	99%	60-140
1,4-DFB	108%	75-125

CONSTITUENT	CAS NO.	RESULT ug/L	PQL ug/L	DATA QUALIFIER(S)
Benzene	71-43-2	<1.0	1.0	
Toluene	108-88-3	<1.0	1.0	
Ethylbenzene	100-41-4	<1.0	1.0	
m,p-Xylene	136777-61-2	<2.0	~~2~~.0	
o-Xylene	95-47-6	<1.0	1.0	

LAS LABORATORIES

P&T GAS/BTEX
P&T GAS/BTEX

Client Sample ID:	RUW00121	LAS Sample ID:	L10351-25
Date Collected:	21-AUG-97	Date Received:	22-AUG-97
Date Analyzed:	28-AUG-97	Analytical Batch ID:	082797-BTEX-GC1-
Date Extracted:	N/A	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	1.0

SURROGATE	RECOVERY	QC Limits
BFB	97%	60-140
1,4-DFB	103%	75-125

CONSTITUENT	CAS NO.	RESULT ug/L	PQL ug/L	DATA QUALIFIER(S
Benzene	71-43-2	<1.0	1.0	
Toluene	108-88-3	<1.0	1.0	
Ethylbenzene	100-41-4	<1.0	1.0	
m,p-Xylene	136777-61-2	<2.0	2.0	
o-Xylene	95-47-6	<1.0	1.0	

CLP

1
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

RUW00114

Lab Name: L.A.S______________________ Contract: IT_INTERNA

Lab Code: LOCK__ Case No.: 822IT_ SAS No.: ______ SDG No.: L10351

Matrix (soil/water): WATER Lab Sample ID: L10351-36_

Level (low/med): LOW__ Date Received: 08/22/97

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic__	3.0	U		P_
7440-39-3	Barium___	114	~~B~~		P_
7440-43-9	Cadmium__	1.0	U		P_
7440-47-3	Chromium_	1.0	U		P_
7439-92-1	Lead_____	2.0	U		P_
7439-97-6	Mercury__	0.20	U		AV
7782-49-2	Selenium_	3.0	U		P_
7440-22-4	Silver___	1.0	U		P_

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: ______

Color After: YELLOW___ Clarity After: CLEAR_ Artifacts: ______

Comments:

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CLP

1

INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

RUW00116

Lab Name: L.A.S____________________ Contract: IT_INTERNA

Lab Code: LOCK__ Case No.: 822IT_ SAS No.: ______ SDG No.: L10351

Matrix (soil/water): WATER Lab Sample ID: L10351-37_

Level (low/med): LOW__ Date Received: 08/22/97

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic__	3.0	U		P_
7440-39-3	Barium__	114	~~B~~		P_
7440-43-9	Cadmium	1.0	U		P_
7440-47-3	Chromium_	1.0	U		P_
7439-92-1	Lead	2.0	U		P_
7439-97-6	Mercury__	0.20	U		AV
7782-49-2	Selenium_	3.0	U		P_
7440-22-4	Silver__	1.0	U		P_

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: ______

Color After: YELLOW___ Clarity After: CLEAR_ Artifacts: ______

Comments:

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CLP

1
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

RUW00117

Lab Name: L.A.S Contract: IT_INTERNA

Lab Code: LOCK__ Case No.: 822IT_ SAS No.: ______ SDG No.: L10351

Matrix (soil/water): WATER Lab Sample ID: L10351-38_

Level (low/med): LOW__ Date Received: 08/22/97

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	6.9	~~B~~		P
7440-39-3	Barium	148	~~B~~		P
7440-43-9	Cadmium	1.0	U		P
7440-47-3	Chromium	9.8	~~B~~		P
7439-92-1	Lead	6.4			P
7439-97-6	Mercury	0.20	U		AV
7782-49-2	Selenium	3.0	U		P
7440-22-4	Silver	1.0	U		P

Color Before: BROWN____ Clarity Before: CLOUDY Texture: ______

Color After: YELLOW___ Clarity After: CLEAR_ Artifacts: ______

Comments:

FORM I - IN

10/23/97 Revision 7

0036

CLP

1
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

RUW00118

Lab Name: L.A.S______________________ Contract: IT_INTERNA

Lab Code: LOCK__ Case No.: 822IT_ SAS No.: ______ SDG No.: L10351

Matrix (soil/water): WATER Lab Sample ID: L10351-41_

Level (low/med): LOW__ Date Received: 08/22/97

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic__	3.0	U		P_
7440-39-3	Barium___	1.0	U		P_
7440-43-9	Cadmium__	1.0	U		P_
7440-47-3	Chromium_	1.0	U		P_
7439-92-1	Lead_____	3.5			P_
7439-97-6	Mercury__	0.20	U		AV
7782-49-2	Selenium_	3.0	U		P_
7440-22-4	Silver___	1.0	U		P_

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: ______

Color After: YELLOW___ Clarity After: CLEAR_ Artifacts: ______

Comments:

FORM I - IN

10/23/97 Revision 7

0027

CLP

1

INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

RUW00119

Lab Name: L.A.S

Contract: IT_INTERNA

Lab Code: LOCK__ Case No.: 822IT_ SAS No.: ______ SDG No.: L10351

Matrix (soil/water): WATER

Lab Sample ID: L10351-42_

Level (low/med): LOW__

Date Received: 08/22/97

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	29.0			P
7440-39-3	Barium	425			P
7440-43-9	Cadmium	1.0	U		P
7440-47-3	Chromium	39.2			P
7439-92-1	Lead	18.5			P
7439-97-6	Mercury	0.20	U		AV
7782-49-2	Selenium	3.0	U		P
7440-22-4	Silver	1.0	U		P

Color Before: BROWN____ Clarity Before: CLOUDY Texture: ______

Color After: YELLOW___ Clarity After: CLEAR_ Artifacts: ______

Comments:

FORM I - IN

10/23/97 Revision 7

0038

CLP

1

INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

RUW00121

Lab Name: L.A.S____________________ Contract: IT_INTERNA

Lab Code: LOCK__ Case No.: 822IT_ SAS No.: ______ SDG No.: L10351

Matrix (soil/water): WATER Lab Sample ID: L10351-43_

Level (low/med): LOW__ Date Received: 08/22/97

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic__	3.0	U		P_
7440-39-3	Barium___	127	~~B~~		P_
7440-43-9	Cadmium__	1.0	U		P_
7440-47-3	Chromium_	1.0	U		P_
7439-92-1	Lead_____	2.5	~~B~~		P_
7439-97-6	Mercury__	0.20	U		AV
7782-49-2	Selenium_	3.0	U		P_
7440-22-4	Silver___	1.0	U		P_

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: ______

Color After: YELLOW___ Clarity After: CLEAR_ Artifacts: ______

Comments:

FORM I - IN

10/23/97 Revision 7

0039

F-9 Fourth Quarter 1997 Analytical Results

A Subsidiary of SPL Incorporated

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DEC 1 8 1997

IT/LAS VEGAS

LAS Laboratories, Inc.

IT INTERNATIONAL CORPORATION

ANALYTICAL DATA REPORT

FOR

TOTAL DISSOLVED SOLIDS, TOTAL SUSPENDED SOLIDS, METALS, VOLATILE AND TOTAL PETROLEUM HYDROCARBONS ORGANICS

ENTERED INTO

FEB 2 4 1998

ITEMS

LOG-IN NUMBER	L11001
QUOTATION NUMBER	P701740-RUILSON
DOCUMENT FILE NUMBER	1107305

LAS LABORATORIES, INC. • 975 Kelly Johnson Drive • Las Vegas, Nevada 89119-3705
Telephone 702-361-0220 • Facsimile 702-361-8146

LAS

December 18, 1997

Mr. Kurt Schmidt
IT International Corporation
4330 S. Valley View, Suite 114
Las Vegas, NV 89103

RE:	**Log-in No.**	**L11001**
	Quotation No.	**P701740-RUILSON**
	Document File No.	**1107305**

The attached data report contains the analytical results of samples that were submitted to LAS Laboratories, Inc. on 7 November 1997.

The temperatures of the three coolers upon receipt were 3, 3, and 3°C. All sample containers coincided with the chain-of-custody documentation. All sample containers were received intact. Samples were received in time to meet the analytical holding time requirements. The following samples for volatile analysis contained headspace: RUW00123 (L11001-4, 5, 6). All discrepancies (if applicable) identified upon receipt of the samples have been forwarded to the client and are documented in the enclosed chain-of-custody records. (See attached Sample Receiving Checklist for details).

The case narratives included in the following attachments provide a detailed description of all events that occurred during sample preparation, analysis, and data review specific to the samples and analytical methods requested.

A list of data qualifiers, chain-of-custody forms, sample receiving checklist, and log-in report are also enclosed representing the samples received within this group.

If you have any questions concerning the analysis or the data, please call Jenny Davis at (702) 361-3955, ext 213. If you are unable to contact the Client Services Representative, please call Mary B. Ford, Acting Client Services Manager, at extension 326.

Release of this data report has been authorized by the Laboratory Director or the Director's designee as evidenced by the following signature.

Sincerely,

Jenny L. Davis

Jenny L. Davis
Client Services Representative

cc: Client Services
Document Control

CASE NARRATIVE
INORGANIC NON METALS ANALYSES

The routine calibration and quality control analyses performed for this batch include as applicable: initial and continuing calibration verification, initial and continuing calibration blanks, method blank(s), laboratory control sample(s), matrix spike sample(s), and duplicate sample(s).

Preparation and Analysis Requirements

All samples were received on November 7, 1997. The samples were logged in as L11001 and prepared and analyzed for:

A. Method 160.1 Total Dissolved Solids (TDS)
B. Method 160.2 Total Suspended Solids (TSS)

Method Blanks

- The concentration levels of all requested analytes in method blanks were below the reporting detection limits.

Holding Time Requirements

- All samples were analyzed within method-specific holding times.

Internal Quality Control

- All Internal Quality Control were within acceptance limits.

Shellee McGrath
Prepared By

December 10, 1997
Date

CASE NARRATIVE
INORGANIC METALS ANALYSES
FILTERED WATER

The routine calibration and quality control analyses performed for this batch include as applicable: instrument tune (ICP/MS only), initial and continuing calibration verification, initial and continuing calibration blanks, method blank(s), laboratory control sample(s), ICP interference check samples (ICP only), serial dilutions, analytical (post-digestion) spike samples, matrix spike (predigestion) sample(s) and duplicate sample(s).

Preparation and Analysis Requirements

- Five filtered water samples for dissolved metals analysis. The samples were prepared and analyzed as LAS Batch 1107ITD. They were analyzed for analytes as requested by the chain-of-custody. The LAS login for this batch is L11001F. Sample RUW00125 (L10516-41) was used for matrix spike, matrix spike duplicate, serial dilution and post-digestion spike analyses. All flags due to the performance of the above-mentioned QC sample are also associated with every sample digested with this batch.

Holding Time Requirements

- All samples were analyzed within the method-specific holding times.

Method Blanks

- Concentration levels of requested analytes in method blanks were below reporting detection limits with the following exception:

- The final continuing calibration blank (CCB4) (6.2 μg/L) in the first analytical run recovered above the RDL for selenium (5.0 μg/L), no corrective action was taken, however, because this blank did not bracket the samples.

Internal Quality Control

- All Internal Quality Control were within acceptance limits with the following exception:

- The matrix spike recovered outside control limits for selenium. The acceptable recovery, however, of the laboratory control sample (LCSW) for selenium indicates that the analytical system was operating within control limits. The out of range recoveries are attributed to matrix interferences. Affected results are flagged with an "N".

Sample Results

- All methods were performed according to ILM03.0. The following qualifiers are reported on the basis of the techniques employed to perform the analyses:

"P" Method 6010A ICP Trace
"AV" Method 7470A Mercury

Milinka B. Watson-Garrett
Prepared By

12/16/97
Date

CASE NARRATIVE
INORGANIC METALS ANALYSES
WATER

The routine calibration and quality control analyses performed for this batch include as applicable: instrument tune (ICP/MS only), initial and continuing calibration verification, initial and continuing calibration blanks, method blank(s), laboratory control sample(s), ICP interference check samples (ICP only), serial dilutions, analytical (post-digestion) spike samples, matrix spike (predigestion) sample(s) and duplicate sample(s).

Preparation and Analysis Requirements

- Six water samples for total metals analysis. The samples were prepared and analyzed as LAS Batch 1107ITT. They were analyzed for the analytes requested by the chain-of-custody. The LAS login for this batch is L10516W. Sample RUW00125 (L10351-34) was used for matrix spike, matrix spike duplicate, and post-digestion spike analyses. All flags due to the performance of the above-mentioned QC sample are also associated with every sample digested with this batch.

Holding Time Requirements

- All samples were analyzed within the method-specific holding times.

Method Blanks

- Concentration levels of requested analytes in method blanks were below reporting detection limits.

- The final continuing calibration blank (CCB4) (6.2 μg/L) in the first analytical run recovered above the RDL for selenium (5.0 μg/L). The sample affected by this blank was rerun and results are associated with this run.

Internal Quality Control

- All Internal Quality Control were within acceptance limits.

Sample Results

- All methods were performed according to ILM03.0. The following qualifiers are reported on the basis of the techniques employed to perform the analyses:

"P" ICPAES - Trace 6010A
"AV" Method 7470A Mercury

Milinka B. Watson-Garrett	12/16/97
Prepared By	**Date**

Organic Analytes - Case Narrative

General Introduction

The Case Narrative associated with the determination of organic analytes is separated into three (3) sections as follows:

SECTION 1

A brief word processed description of each method reported in this package. This is a general summary of the procedures used and quality control measures applied. It is not intended to include client-specific requirements. Results relating to initial calibration criteria and continuing calibration criteria are included in this section. This section will also describe any unusual events or important observations from the processing of the samples for each method. The initials of the reporting specialist compiling the Case Narrative with the date compiled will be at the end of this section.

SECTION 2

2. An *Exception Report* for each method printed from our data base that summarizes the results of all quality control (QC) measures. A separate *Exception Report* is included for each "QC Group" necessary for each method. At LAS, a QC Group is also called a "workgroup", or more descriptively, a "QC Batch". Each *Exception Report* includes:
   a. A table listing all the samples in the QC Group by LAS Sample ID and Client Sample ID with the date analyzed and Analytical Batch.
   b. Statement(s) relating to holding times for all samples in the QC Group.
   c. Statement(s) relating to the Method Blank (MB) for all samples in the QC Group.
   d. A list of all samples in the QC Group requiring reanalysis for dilution(s) or QC outliers.
   e. A list of all samples in the QC Group that failed surrogate recovery criteria with the recovery obtained and the Acceptance Limits.
   f. A list of all QC Samples that failed recovery criteria with the recovery obtained and the Acceptance Limits. The QC Samples are a laboratory control sample (LCS) and a matrix spike (MS)/matrix spike duplicate (MSD) pair. If insufficient sample exists for a MS/MSD pair, a laboratory control sample duplicate (LCSD) is included. Some methods call for a LCS/LCSD pair instead of a MS/MSD and some for MS/MSD and LCS/LCSD pairs.
   g. A list of all samples in the QC Group that failed internal standard criteria with the integrated areas of the internal standard(s) and their retention times. Note: Applicable to gas chromatography/mass spectrometry GC/MS methods only.

SECTION 3

A table describing all LAS default data qualifiers (flags) used to qualify the data reported on the result forms. Client-specific qualifiers may augment or replace these LAS default qualifiers.

Method 8020 Aromatic Volatile Organics

This method identifies and quantifies aromatic volatile organics using gas chromatography (GC) coupled with a photoionization detector (PID). Samples are placed in a specially designed purging chamber and an inert gas is bubbled through the sample. Volatile compounds partition to the gas phase. The gas then passes through a trap where organic compounds are retained. After the purging cycle, the trap is heated which releases the retained compounds into a GC/PID system. Analytes are quantified based on the absolute response of the analytes compared to the initial calibration. If necessary, target analytes detected at reportable levels on the primary column are confirmed on a second column. Confirmation is necessary only when analyzing an unfamiliar matrix or a complex matrix producing GC/PID chromatograms that are difficult to interpret. Standards of the analytes to be confirmed are analyzed on the second column to establish retention times and ensure the analytes to be confirmed can be confirmed at the levels detected. Gas chromatography/mass spectrometry can also be used for confirmation. Analytes that are not confirmed are reported as less than the reporting limit.

Each time that samples are purged quality control check samples are also analyzed. A MB is purged to verify that the system is not contaminating the samples. A LCS containing some or all target analytes in a matrix which does not interfere with the analytical procedure is also purged. Recoveries of analytes in the LCS are compared to control limits to verify that the analytical systems are operating properly. A MS/MSD pair are also analyzed for each group of twenty samples. The MS and MSD samples are portions of client samples that have been spiked identically to the LCS. MS/MSD recoveries can be used to estimate the accuracy and precision of the measurements in a real client sample matrix, and they can be used to determine the effect of the sample matrix on the analytical procedures. Every sample, MB, MS, MSD, and LCS is spiked with surrogates before purging. Recoveries of the surrogates are used to verify performance of the analytical system on a sample by sample basis.

Before samples are analyzed the instrument must have an acceptable five-point initial calibration. Daily, a beginning continuing calibration verification is analyzed to determine if the initial calibration is still valid. Samples are then run in groups of ten. After each ten samples, another continuing calibration verification is analyzed. If a continuing calibration verification shows that either the absolute instrument response or the retention times have changed since the initial calibration, corrective actions are taken which may include reanalysis of the affected samples. A group of samples analyzed between continuing calibration verifications is called an Analytical Batch. A group of samples associated with a MS/MSD pair is called a QC Group. The Exception Report(s) in the following section describe any quality control outliers or comments pertaining to each QC Group.

Results relating to initial and continuing calibration criteria are as follows:
All initial calibration criteria were met.
All continuing calibration criteria were met.

Unusual events or important observations from the processing of the samples are as follows: None

Method 8015M Extractable Petroleum Hydrocarbons

This method quantifies extractable petroleum hydrocarbons using gas chromatography (GC) coupled with a flame ionization detector (FID). Target analytes are ranges of hydrocarbons not specific petroleum products. Examples are of target analytes are product range organics, like Diesel Range Organics or carbon number range organics, like C_{12} to C_{24} Range Organics. All FID-active substances, or practically speaking, all organic species, eluting within the specified range contribute to the reported value. Samples are extracted with an organic solvent to separate the target analytes from the sample matrix. The extract is then concentrated to a final volume. The hydrocarbon range organics in the extract are quantified using GC/FID. To establish the retention time range for the specific target analyte, n-alkanes are analyze to define the chromatographic range of interest. A "common baseline" is then drawn between the n-alkane markers. All peaks eluting within the established retention time range are integrated and the areas summed. Products whose constituents closely match the target range are used to generate a five-point calibration. For example diesel fuel standards are used to calibrate for Diesel Range Organics or C_{12} to C_{24}. Calibration standard chromatograms and sample chromatograms are integrated identically as described above.

Each time that samples are extracted a collection of quality control check samples are also extracted. A MB is extracted to verify that the laboratory procedures are not contaminating the samples. A LCS is extracted which contains the same product used for calibration in a matrix which does not interfere with the analytical procedure. Recoveries of the target analyte in the LCS are compared to control limits to verify that the analytical systems are operating properly. MS/MSD samples are also prepared with each extraction batch, when sufficient sample exists. The MS and MSD samples are portions of client samples that have been spiked identically to the LCS. Recoveries of the spiked products can be used to estimate the accuracy and precision of the measurements in a real client sample matrix, and they can be used to determine the effect of the sample matrix on the analytical procedures. In cases where there is not enough sample for an MS and MSD, a duplicate of the LCS, a LCSD, is prepared. Every sample, MB, MS, MSD, and LCS is spiked with a surrogate compound, n-octacosane, before extraction. Recoveries of the surrogate are used to verify performance of the analytical systems on a sample by sample basis. A group of samples extracted together is called an extraction batch or a QC Group. The procedure used for extraction depends on the sample matrix, so samples with different matrices (e.g. solids, aqueous liquids, solvent-miscible organic fluids, etc.) will be extracted in separate QC Groups.

Before extracts are analyzed the instrument must have an acceptable five-point initial calibration. Daily, a beginning continuing calibration verification is analyzed to determine if the initial calibration is still valid. Extracts are then run in groups of ten. After each ten extracts, another continuing calibration verification is analyzed. If a continuing calibration verification shows that either the absolute instrument response or the retention times have changed since the initial calibration, corrective actions are taken which may include reanalysis of the affected extracts. A group of extracts analyzed between continuing calibration verifications is called an Analytical Batch. The Exception Report(s) in the following section describe any quality control outliers or comments pertaining to each QC Group.

Results relating to initial and continuing calibration criteria are as follows:
All initial calibration criteria were met.
All continuing calibration criteria were met.

Unusual events or important observations from the processing of the samples are as follows: None

Prepared By
Patricia Lonergan

December 18, 1997

LAS LABORATORIES

P&T GAS/BTEX
EXCEPTION REPORT
QC GROUP: P&T GAS/BTEX_56361

SAMPLE SUMMARY

LAS Sample ID	Client Sample ID	Date Analyzed	Analytical Batch
56361LCS-1	Lab Ctrl Sample	10-NOV-97 12:15	111097-BTEX-GC3
56361MB	Method Blank	10-NOV-97 01:35	111097-BTEX-GC3
56361MS-1	RUW00125	10-NOV-97 02:47	111097-BTEX-GC3
56361MSD-1	RUW00125	10-NOV-97 03:13	111097-BTEX-GC3
L11001-1	RUW00122	10-NOV-97 03:40	111097-BTEX-GC3
L11001-10	RUW00125	10-NOV-97 02:20	111097-BTEX-GC3
L11001-19	RUW00126	10-NOV-97 04:42	111097-BTEX-GC3
L11001-22	RUW00129	10-NOV-97 05:08	111097-BTEX-GC3
L11001-4	RUW00123	10-NOV-97 05:38	111097-BTEX-GC3
L11001-7	RUW00124	10-NOV-97 06:05	111097-BTEX-GC3

HOLDING TIMES
__X__ All holding times were met for samples in this QC group.
__X__ The analytical holding times were met.

METHOD BLANK

__X__ No target analytes were detected in the method blank(s).

SAMPLE RESULTS

__X__ No samples in the QC group required reanalysis.

__X__ No samples in the QC group required a dilution.

SURROGATE RECOVERIES

__X__ All surrogate recoveries met criteria for this QC group.

QC SAMPLE RESULTS

__X__ All QC samples met criteria for this QC group.

LAS LABORATORIES

TOTAL PETROLEUM HYDROCARBONS (TPH)
EXCEPTION REPORT
QC GROUP: 8015M - TPH_55911

SAMPLE SUMMARY

LAS Sample ID	Client Sample ID	e Analyzed	Analytical Batch
55911LCS	Lab Ctrl Sample	NOV-97 14:11	102697-8015-D-6
55911MB	Method Blank	NOV-97 13:26	102697-8015-D-6
55911MS	RUW00125	NOV-97 14:56	102697-8015-D-6
55911MSD	RUW00125	NOV-97 15:41	102697-8015-D-6
L11001-25	RUW00122	NOV-97 17:56	102697-8015-D-7
L11001-26	RUW00124	NOV-97 17:11	102697-8015-D-7
L11001-27	RUW00125	NOV-97 18:41	102697-8015-D-7
L11001-30	RUW00126	NOV-97 19:26	102697-8015-D-7
L11001-31	RUW00129	OV-97 20:10	102697-8015-D-7

HOLDING TIMES
__X__ All holding times were met for samples i is QC group.
__X__ The extraction holding times were met.
__X__ The analytical holding times were met.

METHOD BLANK

__X__ No target analytes were detected in the hod blank(s).

SAMPLE RESULTS

__X__ No samples in the QC group required reana sis.

__X__ No samples in the QC group required a dil ion.

SURROGATE RECOVERIES

__X__ The following samples failed the recovery riteria for this QC group.

LAS Sample ID	Client Sample ID	Parameter	Recovery	Limits
55911LCS	Lab Ctrl Sample	n-OCTACOSANE	169%	26-152
L11001-30	RUW00126	n-OCTACOSANE	170%	26-152

QC SAMPLE RESULTS

__X__ All LCS samples met criteria for this QC group.

__X__ All MS samples met criteria for this QC group.

__X__ The following MSD samples failed the recovery criteria for this QC group.

LAS LABORATORIES

TOTAL PETROLEUM HYDROCARBONS (TPH)
EXCEPTION REPORT
QC GROUP: 8015M - TPH_55911

LAS Sample ID	Client Sample ID	Parameter	Recovery	RPD	Limits	
55911MSD	RUW00125	Diesel Range Organics	109	39*	61-143	20

LAS Laboratories, Inc.

DATA QUALIFIERS FOR INORGANIC ANALYSES

[Revised 02/28/97]

For Use on the Analytical Data Reporting Forms	
B	*For CLP Analyses Only* -- Reported value is less than the contract required detection limit (CRDL) but greater than or equal to the instrument detection limit (IDL).
C	*For Routine, Non-CLP Analyses Only* -- Any constituent that was also detected in the associated blank whose concentration was greater than the reporting detection limit (RDL), or instrument detection limit (IDL) for client samples that require "B" flags.
D	Presence of high levels of interfering constituents required dilution of sample which increased the RDL by the dilution factor.
E	Estimated value due to presence of interference.
H	Sample analysis performed outside of method-or client-specified maximum holding time requirement.
M	*For CLP Analyses Only* -- Duplicate injection precision criterion was not met.
N	Matrix spike recovery exceeded acceptance limits.
S	Reported value was determined from the method of standard addition.
U	*For CLP Reporting Only* -- Constituent was analyzed for but not detected (sample quantitation must be corrected for dilution and percent moisture).
W	*For AAS Only* -- Post-digestion spike for Furnace AAS did not meet acceptance criteria and sample absorbance is less than 50% of spike absorbance.
X, Y, or Z	Analyst-defined qualifier.
*	Relative percent difference (RPD) for duplicate analysis exceeded acceptance limits.
+	Correlation coefficient (r) for the MSA is less than 0.995.
For Use on the QC Data Reporting Forms	
a[1]	The spike recovery and/or RPD for matrix spike and matrix spike duplicates cannot be evaluated due to insufficient spiking level compared to the elevated sample analyte concentration.
b[1]	The RPD cannot be computed because the sample and/or duplicate concentration was below the RDL.

[1] Used as footnote designations on the QC summary form.

LAS Laboratories, Inc.
DATA QUALIFIERS FOR ORGANIC ANALYSES

[Revised 02/28/97]

For Use On The Analytical Data Reporting Forms	
A	***For CLP analyses Only*** -- The TIC is a suspected aldol-condensation product.
B	Any constituent that was also detected in the associated blank whose concentration was greater than the practical or reporting detection limit (PQL or RDL), or method detection limit (MDL) for client samples that require "J" flags to be reported.
C	Constituent confirmed by GC/MS analysis. *[pesticide/PCB analyses only]*
D	Constituent detected in the diluted sample. It also indicates that an accurate quantitation is not possible due to surrogates being diluted out of the samples during the course of the analysis.
E	Constituent concentration exceeded the calibration range.
G	The quantitation is not gasoline or diesel but believed to be some other combination of hydrocarbons.
H	Sample analysis performed outside of method- or client-specified maximum holding time requirement.
J	*Estimated value* -- (1) constituent detected at a level less than the RDL or PQL and greater than or equal to the MDL; (2) estimated concentration for TICs ***(For CLP Reporting Only)***.
N	***For CLP Reporting Only*** -- Tentatively identified constituents (TICs) identified based on mass spectral library search.
NQ	Analyte detected, but Not Quantified; see result from subsequent analysis
P	***For CLP Reporting Only*** -- The percent difference between the concentrations detected on both GC columns was greater than 25 percent *[pesticide/PCB analyses only]*.
U	***For CLP Reporting Only*** -- Constituent was analyzed for but not detected (sample quantitation must be corrected for dilution and percent moisture).
X, Y, or Z	Analyst-defined qualifier.
N/A (% Moisture)	N/A in the % moisture cell indicates that data are reported on an "*as received*" basis. A value in the % moisture cell indicates that data are reported based on a "*dry weight*" basis.
For Use On The QC Data Reporting Forms	
*****	QC data (i.e., percent recovery data for matrix spike, matrix spike duplicate, laboratory control standard, or surrogates; and RPD for matrix spike duplicate or unspiked duplicate) exceeded acceptance limits.
a[1]	The spike recovery and/or RPD for matrix spike and matrix spike duplicates cannot be evaluated due to insufficient spiking level compared to the elevated sample analyte concentration.
b[1]	The RPD cannot be computed because the sample and/or duplicate concentration was below the RDL.

[1] Used as footnote designations on the QC Summary Form.

Table B-1
Sample Number and Description

Sample Number	Sample Location or Description
RUW00122	Well RU-06A
RUW00123	Trip Blank
RUW00124	Duplicate of RUW00122 at RU-06A
RUW00125	Well RU-03
RUW00126	Equipment Rinsate
RUW00127	Not Collected - Well RU-05 was dry.
RUW00128	Not Collected - Well RU-07 was dry.
RUW00129	Well RU-08

TPH - Diesel

LAS LABORATORIES

TOTAL PETROLEUM HYDROCARBONS (TPH)
8015M - TPH

Client Sample ID:	RUW00122	LAS Sample ID:	L11001-25
Date Collected:	06-NOV-97	Date Received:	07-NOV-97
Date Analyzed:	15-NOV-97 17:56	Analytical Batch ID:	102697-8015-D-7
Date Extracted:	13-NOV-97	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	0.94
		QC Group:	8015M - TPH_55911

SURROGATE	RECOVERY	QC Limits
n-OCTACOSANE	137%	26-152

CONSTITUENT	CAS NO.	RESULT mg/L	PQL mg/L	DATA QUALIFIER(S)
Diesel Range Organics	TPH	<0.94	0.94	UJ

SD
01/15/98 RSD

LAS LABORATORIES

TOTAL PETROLEUM HYDROCARBONS (TPH)
8015M - TPH

Client Sample ID:	RUW00124	LAS Sample ID:	L11001-26
Date Collected:	06-NOV-97	Date Received:	07-NOV-97
Date Analyzed:	15-NOV-97 17:11	Analytical Batch ID:	102697-8015-D-7
Date Extracted:	13-NOV-97	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	0.94
		QC Group:	8015M - TPH_55911

SURROGATE	RECOVERY	QC Limits
n-OCTACOSANE	99%	26-152

CONSTITUENT	CAS NO.	RESULT mg/L	PQL mg/L	DATA QUALIFIER(S)
Diesel Range Organics	TPH	<0.94	0.94	UJ S8 MS/MSD RPD

LAS LABORATORIES

TOTAL PETROLEUM HYDROCARBONS (TPH)
8015M - TPH

Client Sample ID:	RUW00125	LAS Sample ID:	L11001-27
Date Collected:	06-NOV-97	Date Received:	07-NOV-97
Date Analyzed:	15-NOV-97 18:41	Analytical Batch ID:	102697-8015-D-7
Date Extracted:	13-NOV-97	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	0.94
		QC Group:	8015M - TPH_55911

SURROGATE	RECOVERY	QC Limits
n-OCTACOSANE	144%	26-152

CONSTITUENT	CAS NO.	RESULT mg/L	PQL mg/L	DATA QUALIFIER(S)
Diesel Range Organics	TPH	<0.94	0.94	UJ S4

11/5/15D F PD

LAS LABORATORIES

TOTAL PETROLEUM HYDROCARBONS (TPH)
8015M - TPH

Client Sample ID:	RUW00126	LAS Sample ID:	L11001-30
Date Collected:	06-NOV-97	Date Received:	07-NOV-97
Date Analyzed:	15-NOV-97 19:26	Analytical Batch ID:	102697-8015-D-7
Date Extracted:	13-NOV-97	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	0.94
		QC Group:	8015M - TPH_55911

SURROGATE	RECOVERY		QC Limits
n-OCTACOSANE	170%	*	26-152

CONSTITUENT	CAS NO.	RESULT mg/L	PQL mg/L	DATA QUALIFIER(S)
Diesel Range Organics	TPH	<0.94	0.94	UJ 6d 015/115D RTD

TOTAL PETROLEUM HYDROCARBONS (TPH)
8015M - TPH

Client Sample ID:	RUW00129	LAS Sample ID:	L11001-31
Date Collected:	06-NOV-97	Date Received:	07-NOV-97
Date Analyzed:	15-NOV-97 20:10	Analytical Batch ID:	102697-8015-D-7
Date Extracted:	13-NOV-97	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	0.94
		QC Group:	8015M - TPH_55911

SURROGATE	RECOVERY	QC Limits
n-OCTACOSANE	140%	26-152

CONSTITUENT	CAS NO.	RESULT mg/L	PQL mg/L	DATA QUALIFIER(S)
Diesel Range Organics	TPH	<0.94	0.94	UJ 30 MS/MSD RPD

BTEX

LAS LABORATORIES

P&T GAS/BTEX
P&T GAS/BTEX

Client Sample ID:	RUW00122	LAS Sample ID:	L11001-1
Date Collected:	06-NOV-97	Date Received:	07-NOV-97
Date Analyzed:	10-NOV-97 03:40	Analytical Batch ID:	111097-BTEX-GC3
Date Extracted:	N/A	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	1.0

SURROGATE	RECOVERY	QC Limits
1,4-DFB	97%	75-125
BFB	106%	60-140

CONSTITUENT	CAS NO.	RESULT ug/L	PQL ug/L	DATA QUALIFIER(S)
Benzene	71-43-2	<1.0	1.0	
Toluene	108-88-3	<1.0	1.0	
Ethylbenzene	100-41-4	<1.0	1.0	
m,p-Xylene	136777-61-2	<2.0	2.0	
o-Xylene	95-47-6	<1.0	1.0	

LAS LABORATORIES

P&T GAS/BTEX

P&T GAS/BTEX

Client Sample ID:	RUW00123	LAS Sample ID:	L11001-4
Date Collected:	06-NOV-97	Date Received:	07-NOV-97
Date Analyzed:	10-NOV-97 05:38	Analytical Batch ID:	111097-BTEX-GC3
Date Extracted:	N/A	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	1.0

SURROGATE	RECOVERY	QC Limits
1,4-DFB	93%	75-125
BFB	105%	60-140

CONSTITUENT	CAS NO.	RESULT ug/L	PQL ug/L	DATA QUALIFIER(S)
Benzene	71-43-2	<1.0	1.0	
Toluene	108-88-3	<1.0	1.0	
Ethylbenzene	100-41-4	<1.0	1.0	
m,p-Xylene	136777-61-2	<2.0	2.0	
o-Xylene	95-47-6	<1.0	1.0	

LAS LABORATORIES

P&T GAS/BTEX

P&T GAS/BTEX

Client Sample ID:	RUW00124	LAS Sample ID:	L11001-7
Date Collected:	06-NOV-97	Date Received:	07-NOV-97
Date Analyzed:	10-NOV-97 06:05	Analytical Batch ID:	111097-BTEX-GC3
Date Extracted:	N/A	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	1.0

SURROGATE	RECOVERY	QC Limits
1,4-DFB	94%	75-125
BFB	105%	60-140

CONSTITUENT	CAS NO.	RESULT ug/L	PQL ug/L	DATA QUALIFIER(S)
Benzene	71-43-2	<1.0	1.0	
Toluene	108-88-3	<1.0	1.0	
Ethylbenzene	100-41-4	<1.0	1.0	
m,p-Xylene	136777-61-2	<2.0	2.0	
o-Xylene	95-47-6	<1.0	1.0	

LAS LABORATORIES

P&T GAS/BTEX

P&T GAS/BTEX

Client Sample ID:	RUW00125	LAS Sample ID:	L11001-10
Date Collected:	06-NOV-97	Date Received:	07-NOV-97
Date Analyzed:	10-NOV-97 02:20	Analytical Batch ID:	111097-BTEX-GC3
Date Extracted:	N/A	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	1.0

SURROGATE	RECOVERY	QC Limits
1,4-DFB	95%	75-125
BFB	107%	60-140

CONSTITUENT	CAS NO.	RESULT ug/L	PQL ug/L	DATA QUALIFIER(S)
Benzene	71-43-2	<1.0	1.0	
Toluene	108-88-3	<1.0	1.0	
Ethylbenzene	100-41-4	<1.0	1.0	
m,p-Xylene	136777-61-2	<2.0	2.0	
o-Xylene	95-47-6	<1.0	1.0	

LAS LABORATORIES

P&T GAS/BTEX
P&T GAS/BTEX

Client Sample ID:	RUW00126	LAS Sample ID:	L11001-19
Date Collected:	06-NOV-97	Date Received:	07-NOV-97
Date Analyzed:	10-NOV-97 04:42	Analytical Batch ID:	111097-BTEX-GC3
Date Extracted:	N/A	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	1.0

SURROGATE	RECOVERY	QC Limits
1,4-DFB	91%	75-125
BFB	101%	60-140

CONSTITUENT	CAS NO.	RESULT ug/L	PQL ug/L	DATA QUALIFIER(S)
Benzene	71-43-2	<1.0	1.0	
Toluene	108-88-3	<1.0	1.0	
Ethylbenzene	100-41-4	<1.0	1.0	
m,p-Xylene	136777-61-2	<2.0	2.0	
o-Xylene	95-47-6	<1.0	1.0	

LAS LABORATORIES

P&T GAS/BTEX
P&T GAS/BTEX

Client Sample ID:	RUW00129	LAS Sample ID:	L11001-22
Date Collected:	06-NOV-97	Date Received:	07-NOV-97
Date Analyzed:	10-NOV-97 05:08	Analytical Batch ID:	111097-BTEX-GC3
Date Extracted:	N/A	Analytical Dilution:	1
Matrix:	Water	Preparation Dilution:	1.0

SURROGATE	RECOVERY	QC Limits
1,4-DFB	94%	75-125
BFB	103%	60-140

CONSTITUENT	CAS NO.	RESULT ug/L	PQL ug/L	DATA QUALIFIER(S)
Benzene	71-43-2	<1.0	1.0	
Toluene	108-88-3	<1.0	1.0	
Ethylbenzene	100-41-4	<1.0	1.0	
m,p-Xylene	136777-61-2	<2.0	2.0	
o-Xylene	95-47-6	<1.0	1.0	

RCRA Total Metals with Mercury

CLP

1
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

RUW00122

Lab Name: L.A.S

Contract: IT_INTERNA

Lab Code: LOCK__ Case No.: 1107IT SAS No.: ______ SDG No.: L11001

Matrix (soil/water): WATER

Lab Sample ID: L11001-32_

Level (low/med): LOW__

Date Received: 11/07/97

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M	
7440-38-2	Arsenic	3.0	U		P	
7440-39-3	Barium	113	B		P	113
7440-43-9	Cadmium	1.0	U		P	
7440-47-3	Chromium	4.3	B		P	4.3
7439-92-1	Lead	2.9	B		P	2.9
7439-97-6	Mercury	0.20	U		AV	
7782-49-2	Selenium	4.0	U		P	
7440-22-4	Silver	1.0	U		P	

SH

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: ______

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: ______

Comments:

FORM I - IN

CLP

1
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

RUW00124

Lab Name: L.A.S Contract: IT_INTERNA

Lab Code: LOCK__ Case No.: 1107IT SAS No.: ______ SDG No.: L11001

Matrix (soil/water): WATER Lab Sample ID: L11001-33_

Level (low/med): LOW__ Date Received: 11/07/97

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M	
7440-38-2	Arsenic__	3.0	U		P_	
7440-39-3	Barium___	116	B		P_	116
7440-43-9	Cadmium__	1.0	U		P_	
7440-47-3	Chromium_	1.2	B		P_	1.2
7439-92-1	Lead_____	2.0	U		P_	
7439-97-6	Mercury__	0.20	U		AV	
7782-49-2	Selenium_	4.0	U		P_	
7440-22-4	Silver___	1.0	U		P_	

SA

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: ______

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: ______

Comments:

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CLP

1

INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

RUW00125

Lab Name: L.A.S____________________ Contract: IT_INTERNA

Lab Code: LOCK__ Case No.: 1107IT SAS No.: ______ SDG No.: L11001

Matrix (soil/water): WATER Lab Sample ID: L11001-34_

Level (low/med): LOW__ Date Received: 11/07/97

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M	
7440-38-2	Arsenic__	4.2	B		P_	4.2
7440-39-3	Barium___	155	B		P_	155 SA
7440-43-9	Cadmium__	1.0	U		P_	
7440-47-3	Chromium_	9.3	B		P_	9.3
7439-92-1	Lead_____	5.3			P_	
7439-97-6	Mercury__	0.20	U		AV	
7782-49-2	Selenium_	4.0	U		P_	
7440-22-4	Silver___	1.0	U		P_	

Color Before: COLORLESS Clarity Before: CLOUDY Texture: ______

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: ______

Comments:

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CLP

1
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

RUW00126

Lab Name: L.A.S___________________ Contract: IT_INTERNA

Lab Code: LOCK__ Case No.: 1107IT SAS No.: _______ SDG No.: L11001

Matrix (soil/water): WATER Lab Sample ID: L11001-37_

Level (low/med): LOW__ Date Received: 11/07/97

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic__	3.0	U		P_
7440-39-3	Barium___	1.0	U		P_
7440-43-9	Cadmium__	1.0	U		P_
7440-47-3	Chromium_	1.0	U		P_
7439-92-1	Lead_____	2.0	U		P_
7439-97-6	Mercury__	0.20	U		AV
7782-49-2	Selenium_	4.0	U		P_
7440-22-4	Silver___	1.0	U		P_

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _______

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _______

Comments:

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CLP

1

INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

RUW00129

Lab Name: L.A.S____________________ Contract: IT_INTERNA

Lab Code: LOCK__ Case No.: 1107IT SAS No.: _______ SDG No.: L11001

Matrix (soil/water): WATER Lab Sample ID: L11001-38_

Level (low/med): LOW__ Date Received: 11/07/97

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M	
7440-38-2	Arsenic__	3.0	U		P_	
7440-39-3	Barium___	116	B		P_	116
7440-43-9	Cadmium__	1.0	U		P_	
7440-47-3	Chromium_	1.3	B		P_	13 SH
7439-92-1	Lead_____	2.0	U		P_	
7439-97-6	Mercury__	0.20	U		AV	
7782-49-2	Selenium_	5.0			P_	5.0 U <5x Blank contam
7440-22-4	Silver___	1.0	U		P_	

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: _______

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: _______

Comments:

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F-191

RCRA Dissolved Metals with Mercury

CLP

1
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

RUW00122

Lab Name: L.A.S Contract: IT_INTERNA

Lab Code: LOCK__ Case No.: 1107IT SAS No.: ______ SDG No.: L11001F

Matrix (soil/water): WATER Lab Sample ID: L11001-39_

Level (low/med): LOW__ Date Received: 11/07/97

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	3.0	U		P
7440-39-3	Barium	108	B		P
7440-43-9	Cadmium	1.0	U		P
7440-47-3	Chromium	1.0	U		P
7439-92-1	Lead	2.0	U		P
7439-97-6	Mercury	0.20	U		AV
7782-49-2	Selenium	4.0	U	N	P
7440-22-4	Silver	1.0	U		P

108 (SW)

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: ______

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: ______

Comments:

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CLP

1

INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

RUW00124

Lab Name: L.A.S Contract: IT_INTERNA

Lab Code: LOCK__ Case No.: 1107IT SAS No.: ______ SDG No.: L11001F

Matrix (soil/water): WATER Lab Sample ID: L11001-40_

Level (low/med): LOW__ Date Received: 11/07/97

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M	
7440-38-2	Arsenic	3.0	U		P	
7440-39-3	Barium	109	B		P	109
7440-43-9	Cadmium	1.0	U		P	
7440-47-3	Chromium	1.0	U		P	
7439-92-1	Lead	2.0	U		P	
7439-97-6	Mercury	0.20	U		AV	
7782-49-2	Selenium	4.0	U	N	P	
7440-22-4	Silver	1.0	U		P	

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: ______

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: ______

Comments:

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CLP

1
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

RUW00125

Lab Name: L.A.S Contract: IT_INTERNA

Lab Code: LOCK__ Case No.: 1107IT SAS No.: ______ SDG No.: L11001F

Matrix (soil/water): WATER Lab Sample ID: L11001-41_

Level (low/med): LOW__ Date Received: 11/07/97

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M	
7440-38-2	Arsenic	3.0	U		P	
7440-39-3	Barium	70.2	B		P	70.2 SEH
7440-43-9	Cadmium	1.0	U		P	
7440-47-3	Chromium	1.0	U		P	
7439-92-1	Lead	2.0	U		P	
7439-97-6	Mercury	0.20	U		AV	
7782-49-2	Selenium	7.6		N	P	7.6 J SEH [illegible] MS/MSD [illegible]
7440-22-4	Silver	1.0	U		P	

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: ______

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: ______

Comments:

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CLP

1

INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

RUW00126

Lab Name: L.A.S ________ Contract: IT_INTERNA

Lab Code: LOCK__ Case No.: 1107IT SAS No.: ______ SDG No.: L11001F

Matrix (soil/water): WATER Lab Sample ID: L11001-44_

Level (low/med): LOW__ Date Received: 11/07/97

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic__	3.0	U		P_
7440-39-3	Barium___	1.0	U		P_
7440-43-9	Cadmium__	1.0	U		P_
7440-47-3	Chromium_	1.0	U		P_
7439-92-1	Lead_____	2.0	U		P_
7439-97-6	Mercury__	0.20	U		AV
7782-49-2	Selenium_	4.0	U	__N___	P_
7440-22-4	Silver___	1.0	U		P_

Color Before: COLORLESS Clarity Before: CLEAR_ Texture: ______

Color After: COLORLESS Clarity After: CLEAR_ Artifacts: ______

Comments:

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CLP

1
INORGANIC ANALYSES DATA SHEET

CLIENT ID NO.

RUW00129

Lab Name: L.A.S   Contract: IT_INTERNA

Lab Code: LOCK__   Case No.: 1107IT   SAS No.: _______   SDG No.: L11001F

Matrix (soil/water): WATER   Lab Sample ID: L11001-45_

Level (low/med): LOW__   Date Received: 11/07/97

% Solids: __0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L_

CAS No.	Analyte	Concentration	C	Q	M	
7440-38-2	Arsenic__	3.0	U		P_	
7440-39-3	Barium__	105	B		P_	105
7440-43-9	Cadmium__	1.0	U		P_	
7440-47-3	Chromium_	1.0	U		P_	
7439-92-1	Lead___	2.0	U		P_	
7439-97-6	Mercury__	0.20	U		AV	
7782-49-2	Selenium_	5.0	B	N	P_	5.0 J
7440-22-4	Silver__	1.0	U		P_	

Color Before: COLORLESS   Clarity Before: CLEAR_   Texture: _______

Color After: COLORLESS   Clarity After: CLEAR_   Artifacts: _______

Comments:

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Total Dissolved Solids
and
Total Suspended Solids

LAS Laboratories, Inc.

WET CHEM DATA REPORT
Account Name: IT International Corporation, Las Vegas
Project Name: IT RULISON
Project Desc: Rulison groundwater sample

Client Sample ID: RUW00122
Date Collected: 06-NOV-97
Matrix: Water

Login Number: L11001
Date Received: 07-NOV-97

Constituent	Method	Batch	Value	MDL	RDL	Dil	Qual	Units	Analyzed	Lab ID
TOTAL DISSOLVED SOLIDS	160.1	55972	400.	10.	40.	1		mg/L	13-NOV-97	L11001-46
NON FILTERABLE RESIDUE	160.2	55974	16	7.0	12.	1		mg/L	13-NOV-97	L11001-53

RPT NAME: genions2 TYPE (S=SDG, L=Login): L LIST: ANALYTICAL TRACE: Y SOLIDS ADJUSTED: N/A UNITS: mg QC Flag: Y

LAS Laboratories, Inc.

WET CHEM DATA REPORT
Account Name: IT International Corporation, Las Vegas
Project Name: IT RULISON
Project Desc: Rulison groundwater sample

Client Sample ID: RUW00124
Date Collected: 06-NOV-97
Matrix: Water

Login Number: L11001
Date Received: 07-NOV-97

Constituent	Method	Batch	Value	MDL	RDL	Dil	Qual	Units	Analyzed	Lab ID
TOTAL DISSOLVED SOLIDS	160.1	55972	395.	10.	40.	1		mg/L	13-NOV-97	L11001-47
NON FILTERABLE RESIDUE	160.2	55974	12	7.0	12.	1		mg/L	13-NOV-97	L11001-54

RPT NAME: genions2 TYPE (S=SDG, L=Login): L LIST: ANALYTICAL TRACE: Y SOLIDS ADJUSTED: N/A UNITS: mg QC Flag: Y

LAS Laboratories, Inc.

WET CHEM DATA REPORT
Account Name: IT International Corporation, Las Vegas
Project Name: IT RULISON
Project Desc: Rulison groundwater sample

Client Sample ID: RUW00125
Date Collected: 06-NOV-97
Matrix: Water

Login Number: L11001
Date Received: 07-NOV-97

Constituent	Method	Batch	Value	MDL	RDL	Dil	Qual	Units	Analyzed	Lab ID
TOTAL DISSOLVED SOLIDS	160.1	55972	416.	10.	40.	1		mg/L	13-NOV-97	L11001-48
NON FILTERABLE RESIDUE	160.2	55974	381	7.0	12.	1		mg/L	13-NOV-97	L11001-55

RPT NAME: genions2 TYPE (S=SDG, L=Login): L LIST: ANALYTICAL TRACE: Y SOLIDS ADJUSTED: N/A UNITS: mg QC Flag: Y

LAS Laboratories, Inc.

WET CHEM DATA REPORT
Account Name: IT International Corporation, Las Vegas
Project Name: IT RULISON
Project Desc: Rulison groundwater sample

Client Sample ID: RUW00126
Date Collected: 06-NOV-97
Matrix: Water

Login Number: L11001
Date Received: 07-NOV-97

Constituent	Method	Batch	Value	MDL	RDL	Dil	Qual	Units	Analyzed	Lab ID
TOTAL DISSOLVED SOLIDS	160.1	55972	<10.	10.	40.	1	U	mg/L	13-NOV-97	L11001-51
NON FILTERABLE RESIDUE	160.2	55974	<7.0	7.0	12.	1	U	mg/L	13-NOV-97	L11001-58

RPT NAME: genions2 TYPE (S=SDG, L=Login): L LIST: ANALYTICAL TRACE: Y SOLIDS ADJUSTED: N/A UNITS: mg QC Flag: Y

LAS Laboratories, Inc.

WET CHEM DATA REPORT
Account Name: IT International Corporation, Las Vegas
Project Name: IT RULISON
Project Desc: Rulison groundwater sample

Client Sample ID: RUW00129
Date Collected: 06-NOV-97
Matrix: Water

Login Number: L11001
Date Received: 07-NOV-97

Constituent	Method	Batch	Value	MDL	RDL	Dil	Qual	Units	Analyzed	Lab ID
TOTAL DISSOLVED SOLIDS	160.1	55972	386.	10.	40.	1		mg/L	13-NOV-97	L11001-52
NON FILTERABLE RESIDUE	160.2	55974	176	7.0	12.	1		mg/L	13-NOV-97	L11001-59

RPT NAME: genions2 TYPE (S=SDG, L=Login): L LIST: ANALYTICAL TRACE: Y SOLIDS ADJUSTED: N/A UNITS: mg QC Flag: Y